

# TC-640

*General Export and USA Model*



*Set using ISO screws*

## SPECIFICATIONS

<b>Power Requirements:</b>	AC 100 V, 110 V, 117 V, 120 V, 125 V, 220 V, 240 V 50/60 Hz, 80 W (for General Export) AC 117 V, 60 Hz, 80 W (for USA)	<b>Flutter and Wow:</b>	0.07 % (WRMS) at 7 1/2 ips (19 cm/s) 0.11 % (WRMS) at 3 3/4 ips (9.5 cm/s)									
<b>Track System:</b>	Four-track stereo and mono	<b>Recording Bias Frequency:</b>	120 kHz									
<b>Reel Size:</b>	7" (18 cm) maximum	<b>Inputs:</b>	Two MICROPHONE inputs Impedance; 600 Ω Maximum sensitivity: 0.19 mV (-72 dB)									
<b>Tape Speed:</b>	7 1/2 ips and 3 3/4 ips (19 cm/s and 9.5 cm/s)		Two LINE INPUTS Impedance; 100 kΩ Maximum sensitivity; 60 mV (-22 dB)									
<b>Recording Time:</b> <b>(with 1,800 ft. tape)</b>	<table><thead><tr><th>Tape speed</th><th>4-track stereo</th><th>4-track mono</th></tr></thead><tbody><tr><td>7 1/2 ips (19 cm/s)</td><td>1.5 hrs</td><td>3 hrs</td></tr><tr><td>3 3/4 ips (9.5 cm/s)</td><td>3 hrs</td><td>6 hrs</td></tr></tbody></table>	Tape speed	4-track stereo	4-track mono	7 1/2 ips (19 cm/s)	1.5 hrs	3 hrs	3 3/4 ips (9.5 cm/s)	3 hrs	6 hrs	<b>Outputs:</b>	Two LINE OUTPUTS Impedance; 100 kΩ Output level; 0.775 V (0 dB)
Tape speed	4-track stereo	4-track mono										
7 1/2 ips (19 cm/s)	1.5 hrs	3 hrs										
3 3/4 ips (9.5 cm/s)	3 hrs	6 hrs										
<b>Frequency Response:</b>	30 ~ 20,000 Hz at 7 1/2 ips (19 cm/s) 30 ~ 15,000 Hz at 3 3/4 ips (9.5 cm/s) (with standard tape)		HEADPHONE output Impedance; 8 Ω Output level; 38 mV (-26 dB) with 8 Ω load									
	20 ~ 25,000 Hz at 7 1/2 ips (19 cm/s) 30 ~ 18,000 Hz at 3 3/4 ips (9.5 cm/s) (with SONY SLH tape)	<b>Semiconductors:</b>	22-transistors and 8-diodes									
<b>Signal-to-Noise Ratio:</b>	52 dB (with standard tape) 55 dB (with SONY SLH tape)	<b>Dimensions:</b>	14 17/32(W) x 15 9/16(H) x 9 19/32(D) (369 x 395 x 243.5 mm)									
		<b>Weight:</b>	33 lb 2 oz (15 kg)									

**SONY®**  
**SERVICE MANUAL**

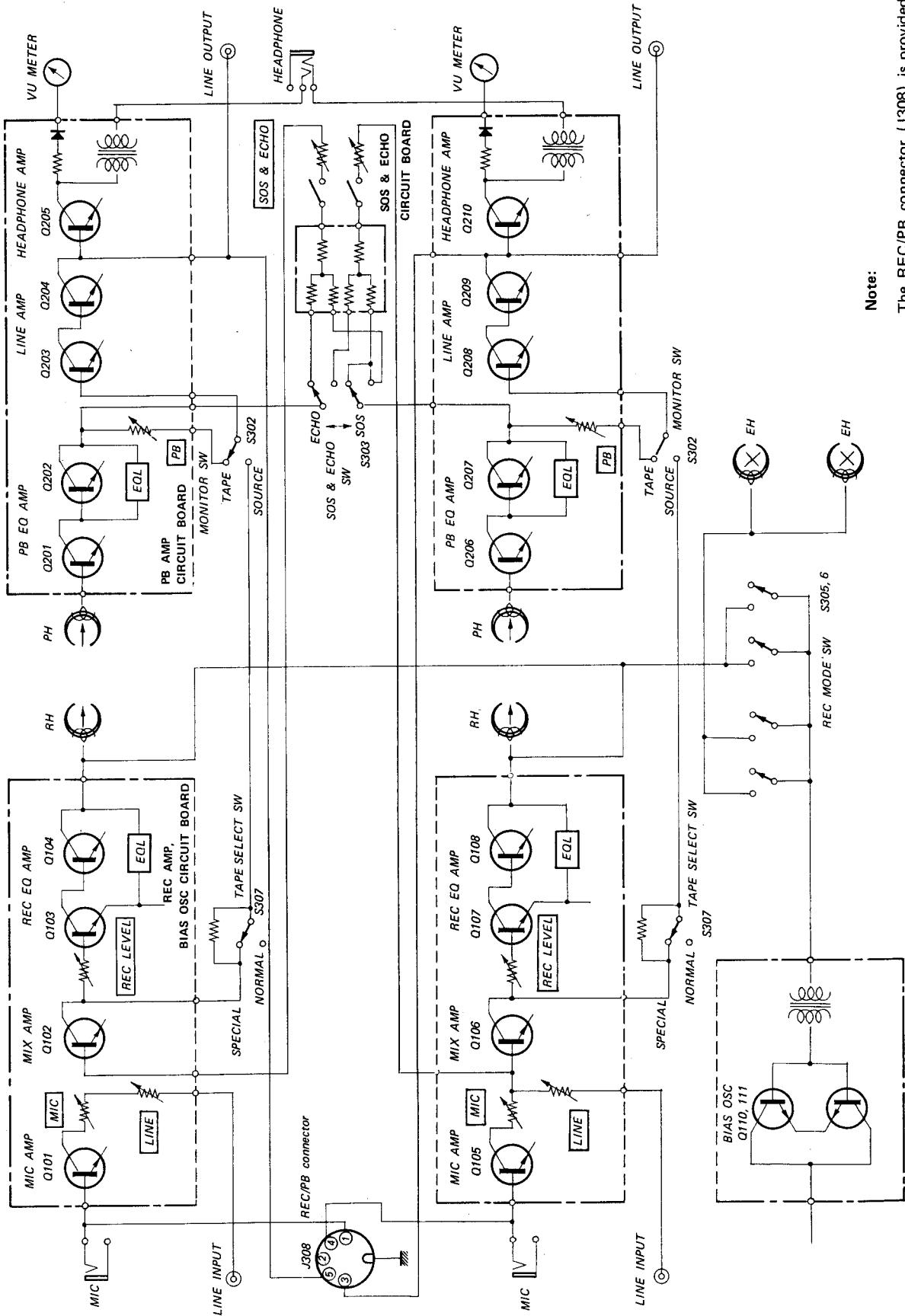
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# SECTION 1

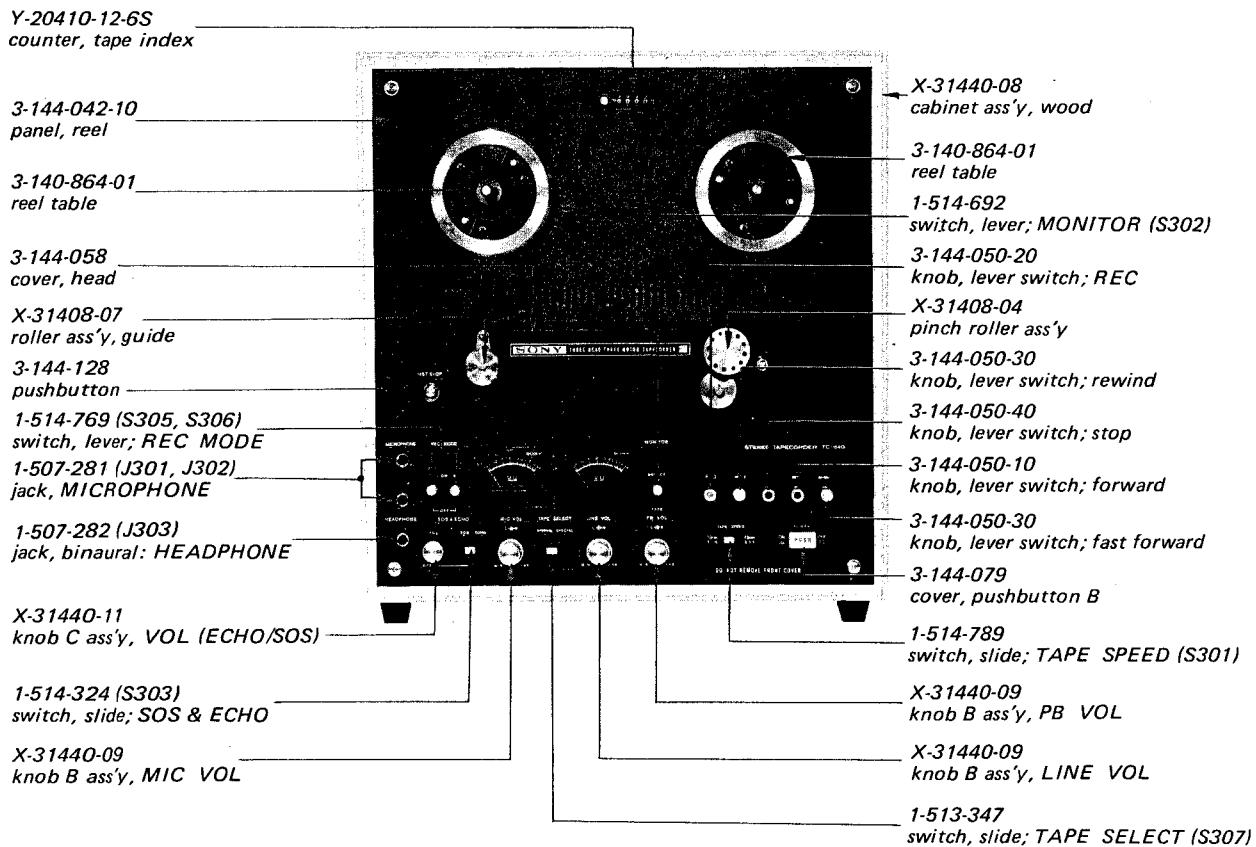
## GENERAL DESCRIPTION

### 1-1. BLOCK DIAGRAM

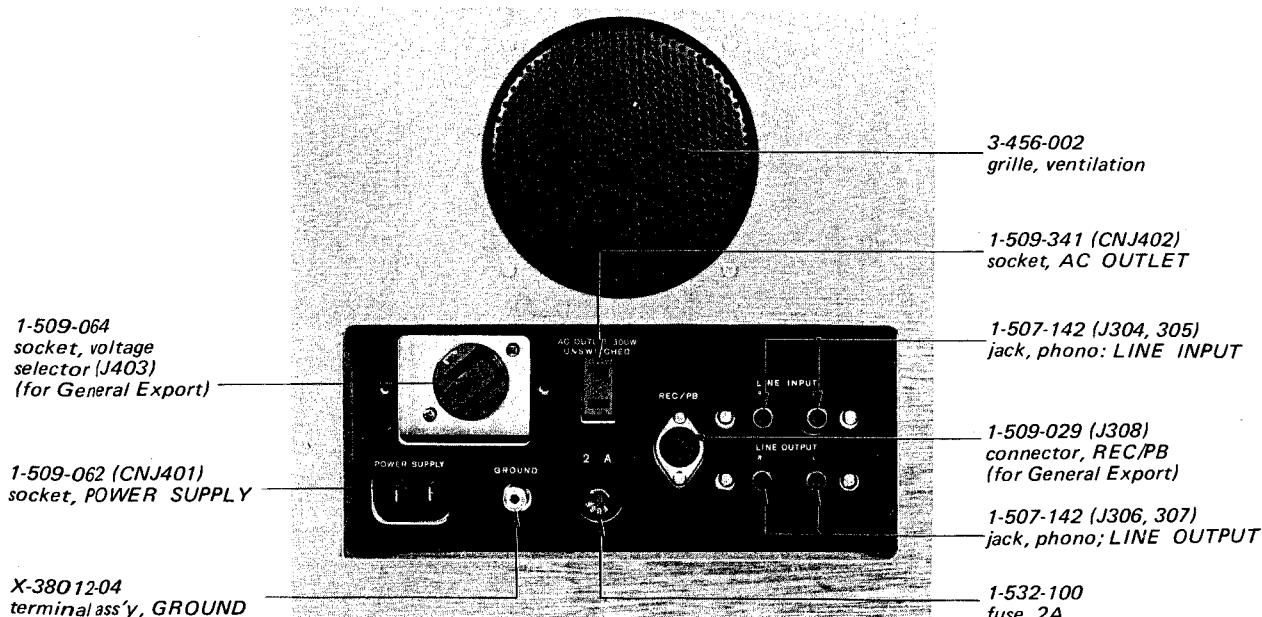


## 1-2. MAJOR PARTS LOCATIONS

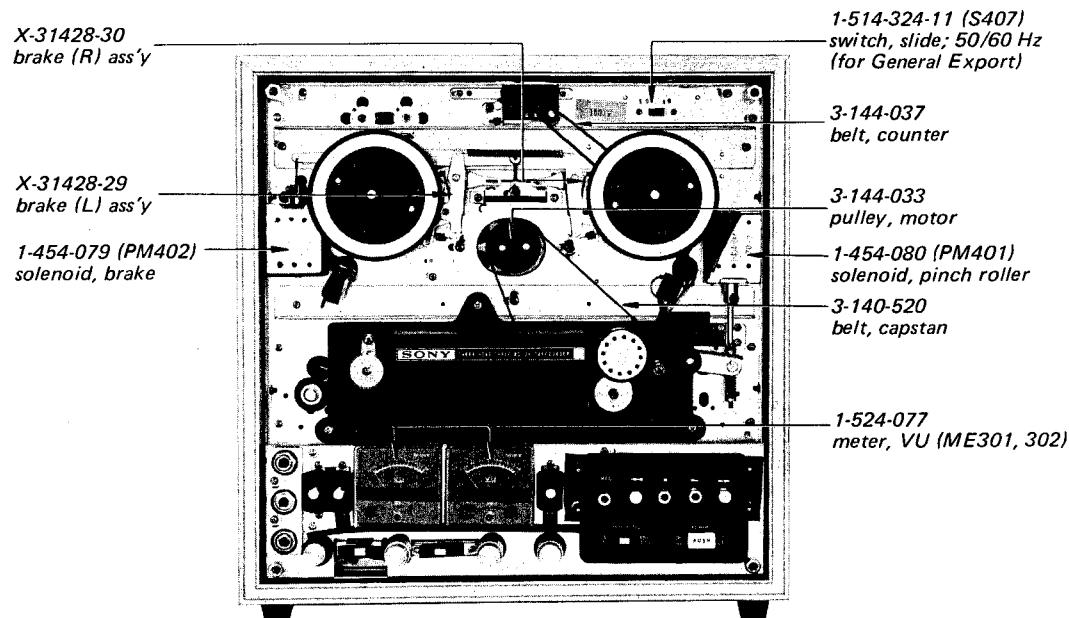
## Cabinet – Front View –



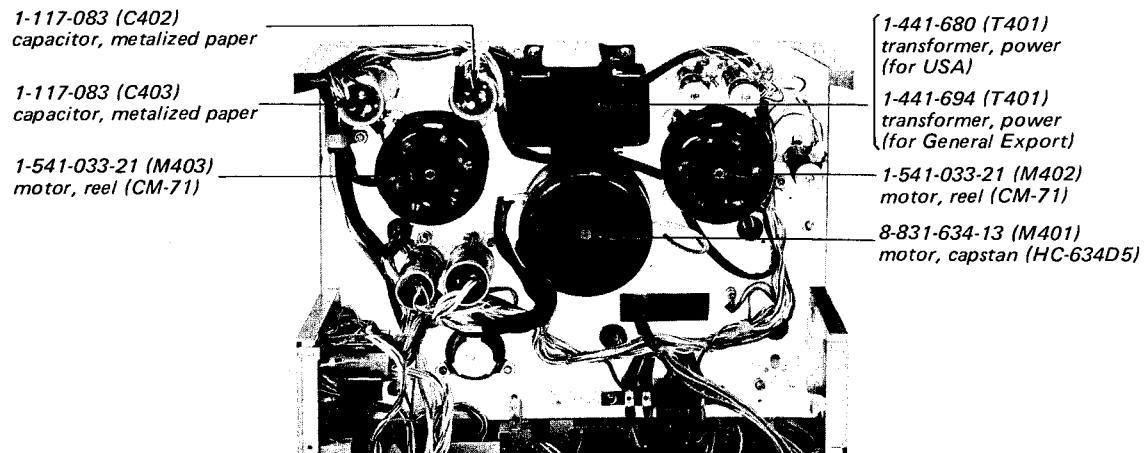
## Cabinet – Back View –



Chassis – Front View –

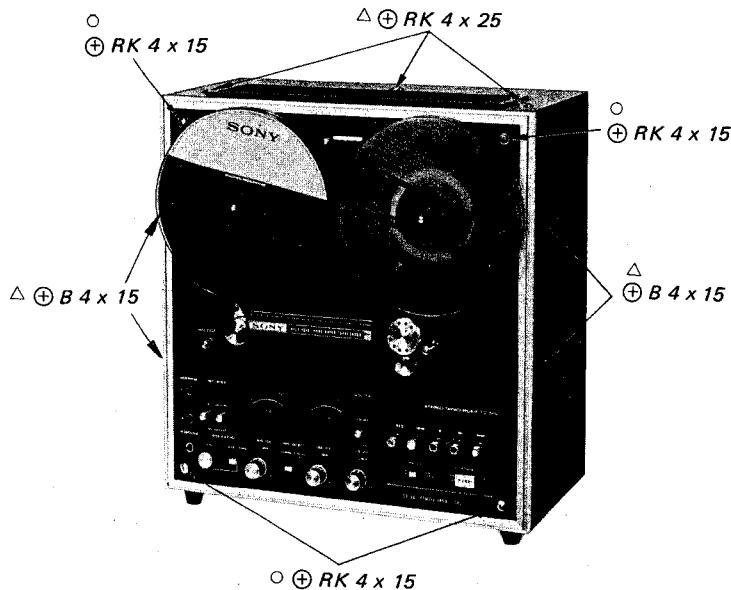


Chassis – Back View –



## SECTION 2 DISASSEMBLY

### Cabinet Removal



*Fig. 2-1.*

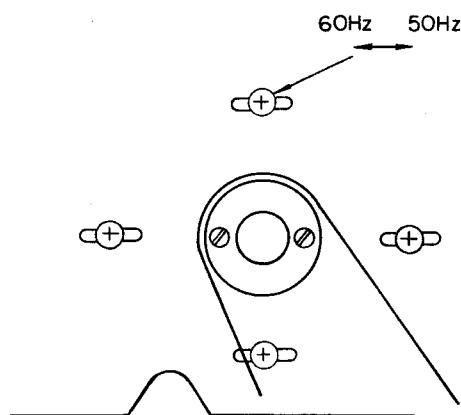
Remove the cabinet by removing the seven screws marked with  $\triangle$  in Fig. 2-1.

### Panel Removal

Remove the panel by removing the four screws ( $\oplus RK 4 \times 15$ ) marked with  $\circ$  in Fig. 2-1.

## SECTION 3 FREQUENCY ADAPTATION

1. Remove the front panel by loosening the four screws.
2. Set the frequency selector for the line frequency of your local area.
3. Remove the motor pulley by the two set screws and reinsert the motor pulley upside down, then tighten the screws again.
4. Slightly loosen the four screws which tighten the capstan motor to the chassis. Then, slide the motor as illustrated and tighten the screws again.
5. Replace the rubber belt on the motor pulley so that the belt is threaded horizontally. Try to turn the motor pulley several times to see whether the belt is threaded securely.
6. Replace the front panel.



*Fig. 3-1. Frequency adaptation*

## SECTION 4

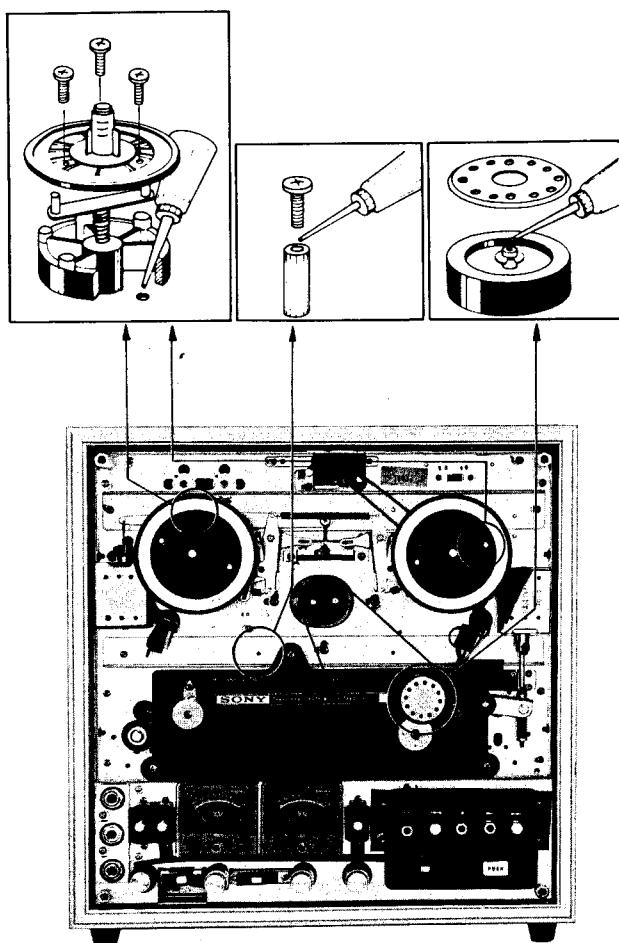
### MAINTENANCE

#### 4-1. LUBRICATION

Use light machine oil and lubricate the pinch roller shaft and capstan drive motor lubricating hole. Avoid excessive lubrication. It will cause slippage of the mechanism. If the oil spills on the pinch roller or the rubber belt, wipe it off immediately with denatured alcohol. To lubricate them, proceed as follows:

- (1) Remove the head cover and the screw securing pinch roller and then lubricate the pinch roller shaft with one drop of light machine oil.
- (2) Remove the reel panel and lubricate the motor lubricating hole with several drops of light machine oil.

**Note:** Use the oil which is comparatively viscous at the pinch roller shaft.



#### 4-2. CLEANING

Dusts and dirts which were brought by tape may stick to the core of the record, playback or erase head, and they may deteriorate the performance of the record and the playback heads. So wipe off the surface of the heads, with a clean and soft cloth damped with denatured alcohol. To ensure proper operation, the heads should be cleaned at least once during each ten hours of actual operation.

#### CAUTION

Do not use any other solvent on the head as some will damage the material which binds the head laminations together. Also do not use any metallic device which will scratch the head.

At the same time, clean capstan, rubber belt, pinch roller, tape guide, flutter filter roller and tension arm.

#### 4-3. DEMAGNETIZING

The record and playback heads may occasionally acquire a degree of permanent magnetization, which will result in an increase of noise level, distortion of any recorded signal, and a gradual erasure of high frequency on any recorded tape which passed over them. These heads may be easily demagnetized with a SONY head demagnetizer HE-2 (optional accessory) or equivalent.

To demagnetize the heads, proceed as follows:

#### Steps:

- (1) Remove the head cover.
- (2) Make sure that power switch on the TC-640 is in the OFF position.
- (3) Connect the demagnetizer to ac power source.
- (4) Bring the tips of the demagnetizer in close proximity to, but not in contact with, the heads so that the tips straddle the gap in the center of the head, run the tips up and down the heads several times, and then slowly withdraw the demagnetizer.

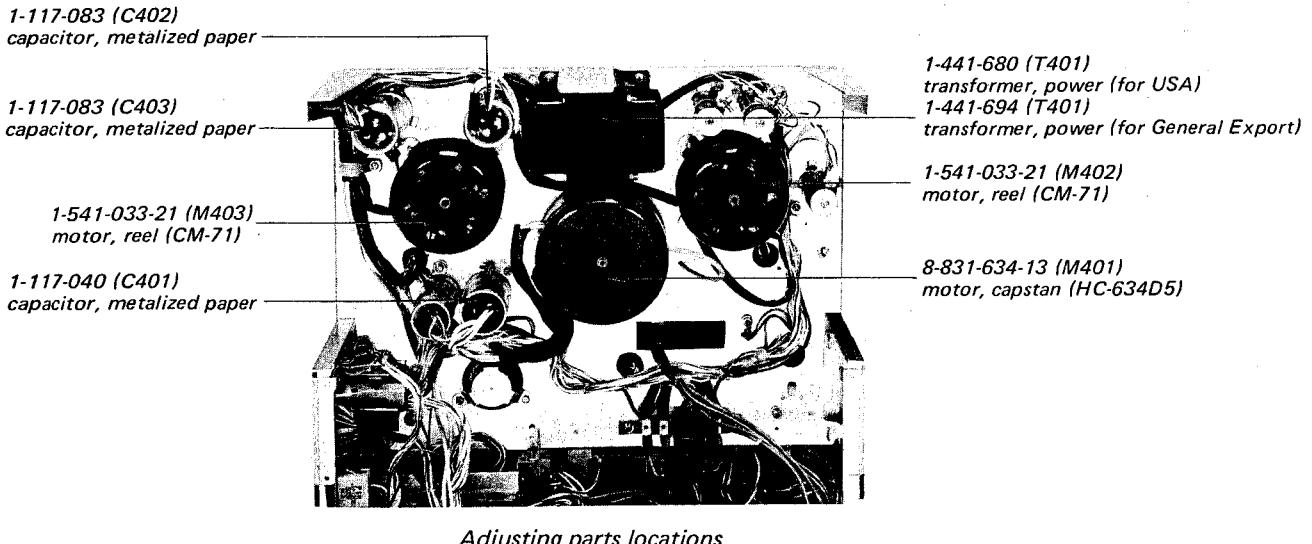
#### CAUTION

Do not bring magnet close to heads.

## SECTION 5

### ADJUSTMENT PROCEDURES

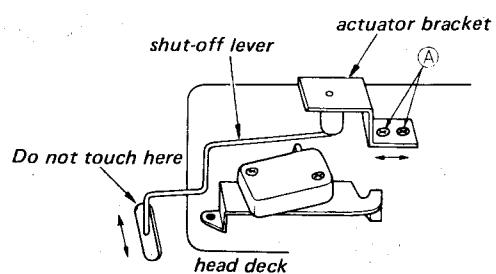
#### 5-1. MECHANICAL ADJUSTMENTS



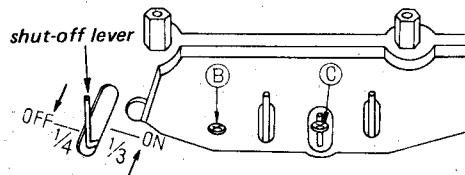
*Adjusting parts locations*

#### 5-1-1. Automatic Shut-off Switch Adjustment

1. Remove the head deck by taking off the two screws, and put it upside down on a soft cloth.
2. Make sure that the shut-off lever does not touch the head deck when pushing it by the hand. See Fig. 5-1-1.
3. If necessary, adjust the position of the actuator bracket by loosening the screws A.
4. Place the head deck in a normal position. See Fig. 5-1-1.
5. Push the shut-off lever slowly by the hand, and check to see that the microswitch turns on when the lever comes the one-third position of the slot as shown in Fig. 5-1-2.
6. If necessary, adjust the position of the microswitch by loosening the screws (B) and (C).
7. Release the shut-off lever, and make sure that the microswitch turns off when the actuator comes at one-fourth position of the slot (See Fig. 5-1-2).
8. Make sure that the shut-off lever reaches the top of the slot when pushing the lever by the hand.
9. If it is not, readjust the position of the actuator bracket.



*Fig. 5-1-1. Automatic shut-off Switch adjustment (1)*



*Fig. 5-1-2. Automatic shut-off switch adjustment (2)*

### 5-1-2. Pinch Roller Pressure Adjustment

1. Place the unit in the play mode to energize the pinch roller solenoid, and turn on the automatic shut-off switch.
- Note:** Hold the shut-off lever so that the shut-off switch is activated (a rubber band or a piece of masking tape will hold the shut-off lever as though tape were threaded on the unit.)
2. Adjust the adjusting nut (A) for 1 mm (3/64") clearance between the link shaft and the adjusting nut (A). See Fig. 5-1-3.
3. Attach the spring scale (5 kg) to the pinch roller shaft with a piece of string. See Fig. 5-1-4. Pull the scale horizontally in the direction shown by the arrow. The capstan shaft, pinch roller and the spring scale should be in a line. Check the reading just when the pinch roller separates from the capstan.
4. Adjust the adjusting nut (B) for  $2.2 \pm 0.2$  kg. (4.4 to 5.3 lb)
5. Repeat steps 2 to 4 several times.
6. After adjustment, lock the adjusting nut (B) by the lock nut (B).
7. Adjust the adjusting nut (A) for the clearance of 0.1 to 0.2 mm between the lock nut (A) and the link shaft.
8. Lock the adjusting nut (A) by the lock nut (A).
9. Check for the correct value again.

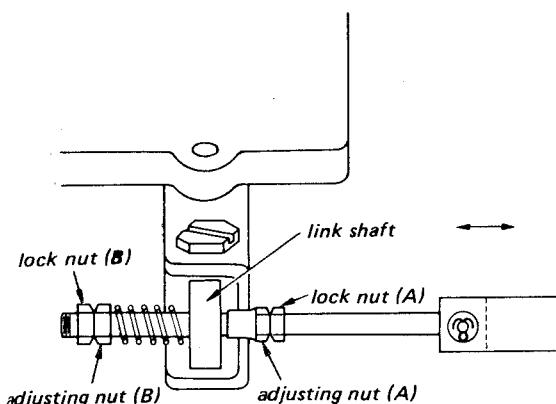


Fig. 5-1-3. Pinch roller pressure adjustment (1)

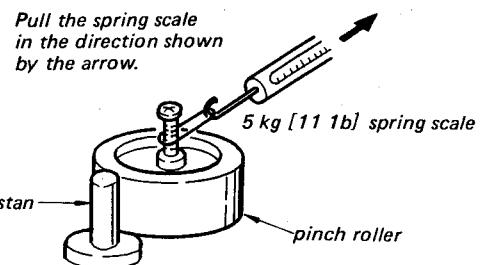


Fig. 5-1-4. Pinch roller pressure adjustment (2)

### 5-1-3. Microswitch Position Adjustment

1. Check to see that the microswitch (for pinch roller solenoid) is turned on when the pinch roller touches the capstan. See Fig. 5-1-5.
2. If it is not, adjust the position of the microswitch by loosening the screws A.

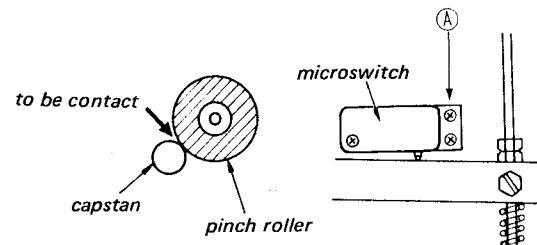


Fig. 5-1-5. Microswitch position adjustment

### 5-1-4. Reel Motor Torque Adjustment

#### Take-up Motor Torque Adjustment

1. Place the reel with string wound several turns clockwise on the hub (44 mm dia) onto the take-up reel table. Tie the string to the spring scale.
2. Hold the shut-off lever so that the shut-off switch is activated (a rubber band or a piece of masking tape will hold the shut-off lever as though tape were threaded on the unit).
3. Place the unit in the play mode. Pull the spring scale and then allow to take up the string on the reel while approaching the scale to the reel at the same speed of tape running. Adjust RV401 for 330 to 350 g-cm (4.58 to 4.86 oz. inch) on the spring scale. See Fig. 5-1-6.

**Note:** Read the scale while moving it.

*Back Tension Torque Adjustment*

1. Place the empty hub with string wound several turns counterclockwise on the hub (44 mm dia) onto the supply reel table. Tie the string to the spring scale.
2. Hold the shut-off lever so that the shut-off switch is activated (a rubber band or a piece of masking tape will hold the shut-off lever as though tape were threaded on the unit.)
3. Place the unit in the play mode. Pull the spring scale at the same speed of tape running. Adjust RV402 for 240 to 260 g-cm (3.32 to 3.60 oz. inch) on the spring scale. See Fig. 5-1-6.

**Note:** Read the scale while pulling it.

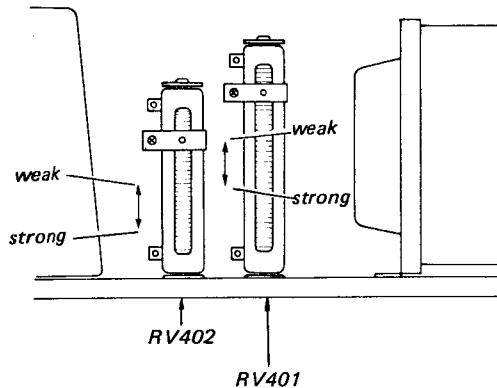


Fig. 5-1-6. Reel motor torque adjustment

**5-1-5. Brake Torque Adjustment**

This adjustment should be performed for both supply and take-up sides.

**Note:** The instructions in [ ] are applied to the supply brake torque adjustment.

1. Place the unit in the STOP mode.
2. Bend the portion  $\Delta$  of the brake lever with a pair of pliers so that the clearance between the brake lever and the limiter is approx. 2 mm (5/64").
3. Place an empty reel with string wound several turns counterclockwise [clockwise] on the hub onto the reel table.  
Tie the spring to a spring scale.

4. Pull the spring scale horizontally at a constant speed, making sure that the string does not touch either flange of the reel. The reel table will rotate counterclockwise [ clockwise ]. Take a reading only when the reel table is in steady motion.
5. Make sure that the brake torque is 350 to 450 g-cm (4.86 to 6.25 oz. inch).
6. Place an empty reel with string wound several turns clockwise [counterclockwise] on the hub onto the reel table.  
Tie the spring to a spring scale.
7. Pull the scale horizontally at constant speed, making sure that the string does not touch either flange of the reel. The reel table will rotate clockwise [ counterclockwise ]. Take a reading only when the reel table is in steady motion.
8. Make sure that the brake torque is 1,000 to 1,300 g-cm (13.9 to 18.1 oz. inch).
9. If it is not, change the hooking position of the spring for the specified brake torque.
10. Check to see that the center pole of the solenoid should be pulled out from the solenoid by approx. 3 mm (1/8") in STOP mode as shown in Fig. 5-1-9.  
If it is not, adjust the position of the brake arm bracket A marked with  $\star$ .
11. Make sure that the capstan belt does not rub against the portion marked with  $\blacktriangle$  of the brake lever in the play mode.

## Specification:

Brake Torque of Supply Reel  
in clockwise turning . . 350 - 450 g-cm  
(4.86 - 6.25 oz. inch)  
in counterclockwise turning  
. . 1,000 - 1,300 g-cm  
(13.9 - 18.1 oz. inch)

Brake Torque of Take-up Reel  
in clockwise turning . . 1,000 - 1,300 g-cm  
(13.9 - 18.1 oz. inch)  
in counterclockwise turning  
. . 350 - 450 g-cm  
(4.86 - 6.25 oz. inch)

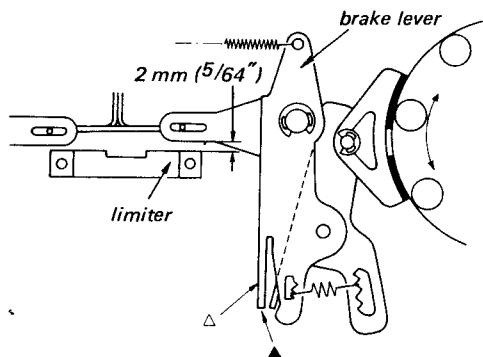


Fig. 5-1-7. Brake torque adjustment (1)

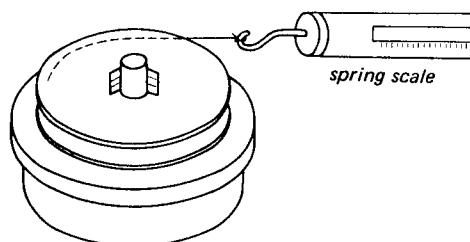


Fig. 5-1-8. Brake torque adjustment (2)

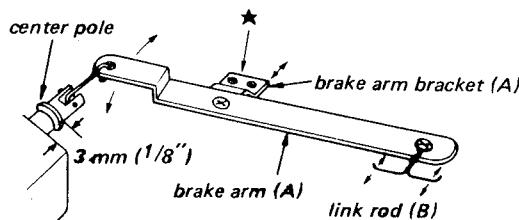


Fig. 5-1-9. Brake torque adjustment (3)

#### 5-1-6. Reel Table Height Adjustment

1. Place the unit in the play mode.
2. See Fig. 5-1-11. Adjust the height of the take-up reel table by loosening the set screws with an allen wrench so that the tape is on the middle portion between the upper and lower flanges of the reel.
3. Check for the supply reel table height in the rewind mode.

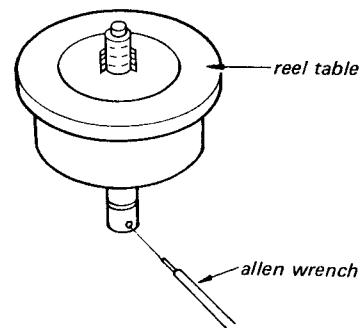


Fig. 5-1-10. Reel table height adjustment (1)

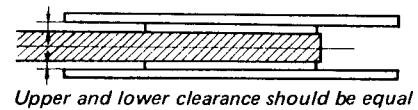


Fig. 5-1-11. Reel table height adjustment (2)

## 5-2. ELECTRICAL ADJUSTMENTS

Before making adjustments, carefully read the followings.

- Clean the record, playback and erase heads with a soft cloth dampened with denatured alcohol.
- Demagnetize the record and playback heads with a head demagnetizer (SONY HE-2 or equivalent).
- Set the switches to the following positions, unless otherwise indicated.

MONITOR switch ..... TAPE  
 TAPE SELECT switch ..... NORMAL  
 ECHO & SOS VOL switch ... OFF  
 REC MODE switch ..... OFF  
 TAPE SPEED switch ..... 19 cm/s

### 4. Input Connection

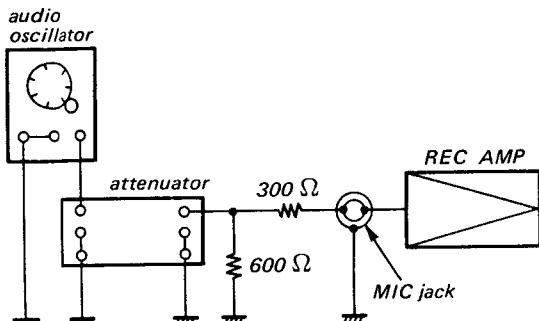


Fig. 5-2-1.

### 5. Output Connection

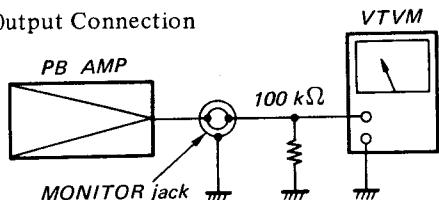


Fig. 5-2-2.

- Input and output levels are specified as follows, unless otherwise indicated.

#### Normal input level

	<u>MICROPHONE</u>	<u>LINE INPUT</u>
Input signal level	-60 dB (0.775 mV)	-10 dB (0.245 V)
Signal source impedance	600 Ω	100 kΩ

#### Normal output level

	<u>LINE OUT</u>	<u>HEADPHONE</u>
Output level	0 dB (0.775 V)	-28 dB (31 mV)
Load resistor	100 kΩ	8 Ω

- Set the VOL controls to the following position, unless otherwise indicated.

- (1) **MIC VOL** (In using the MIC jack)  
 Set the LINE VOL controls extremely counterclockwise and the MONITOR switch to SOURCE. Deliver a 1 kHz signal (-60 dB) to the MIC jack and adjust the MIC VOL controls so that the LINE OUT level is 0 dB (0.775 V).

- (2) **LINE VOL** (In using the LINE INPUT jack)  
 Set the MIC VOL controls extremely counterclockwise and the MONITOR switch to SOURCE. Deliver a 1 kHz signal (-10 dB) to the LINE INPUT jack and adjust the LINE VOL controls so that the LINE OUT level is 0 dB (0.775 V).

- (3) **PB VOL**

Set the MONITOR switch to TAPE. Play the 1st tone (400 Hz, 0 dB) of SONY alignment tape and adjust the PB VOL controls so that the LINE OUT level is 0 dB (0.775 V).

- The adjustment should be performed for both L-CH and R-CH.
- The test equipments required for the adjustment are as follows:

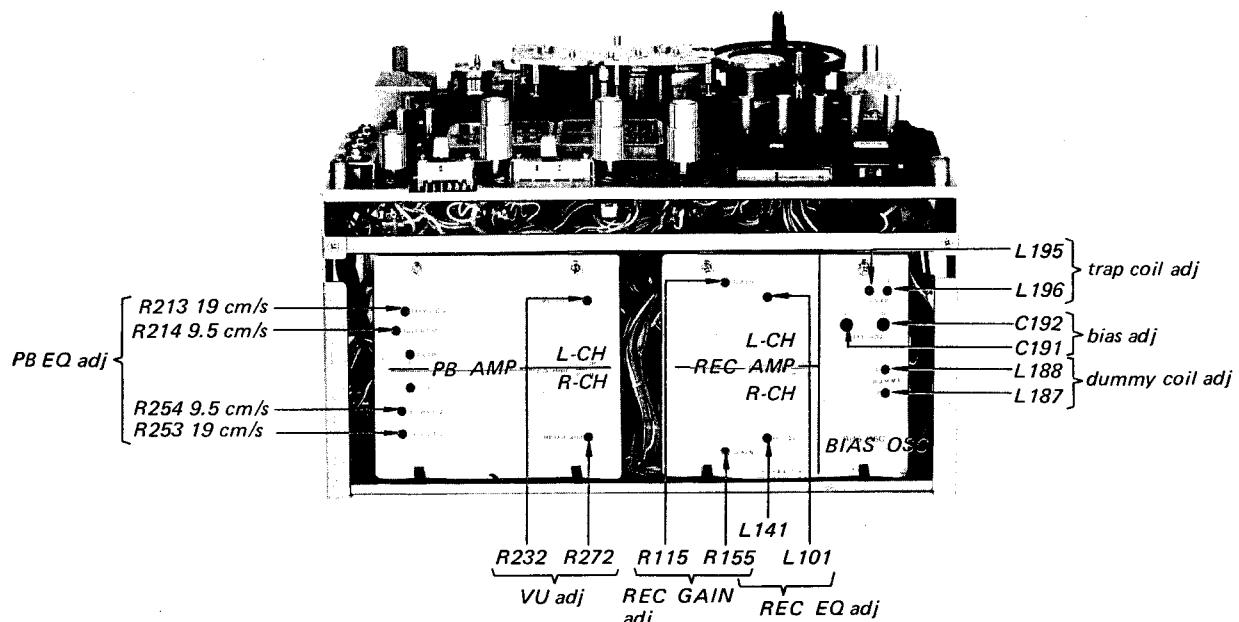
Audio oscillator  
 Attenuator  
 Fixed resistors 100 kΩ, 2.2 kΩ and 2.2 kΩ  
 oscilloscope

VTVM  
 Standard tape (blank)  
 SONY SLH tape (blank)  
 Non-metallic screwdriver  
 SONY alignment tapes J-19-F2, J-9-F1,  
 J-19-A2  
 distortion meter  
 1 kHz bandpass filter

- A blank test tape should be a new tape or a well-demagnetized tape.

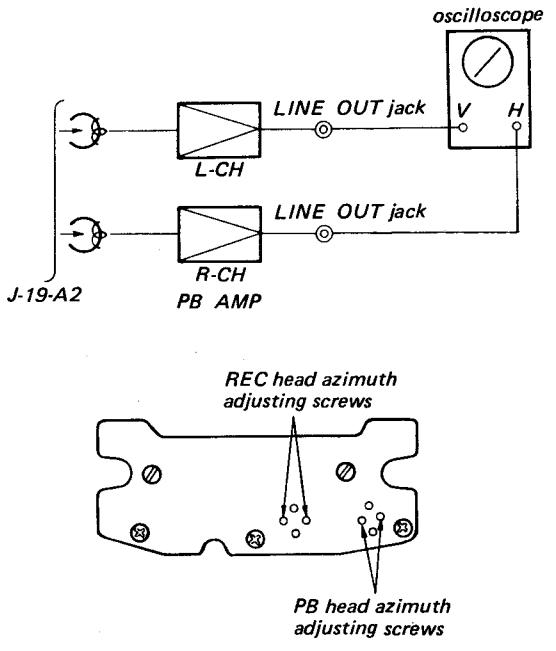
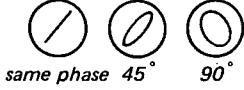
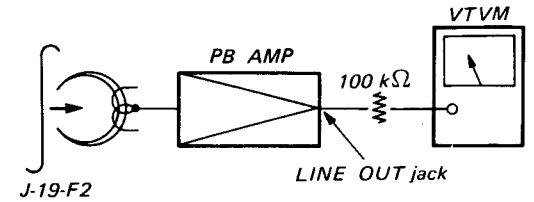
- The following SONY alignment tapes are required for the adjustments. They contain the following information in the sequence indicated.

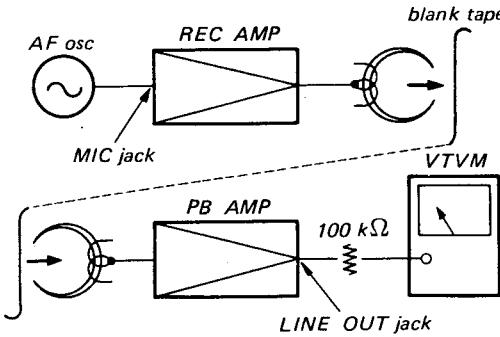
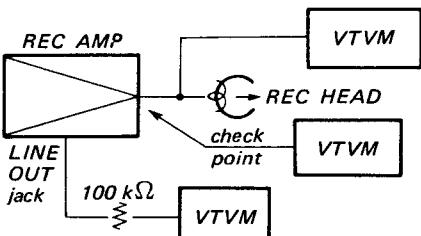
tone tape	1st	2nd	3rd	4th	5th	6th	7th
J-19-F1	5 kHz -10 dB	400 Hz 0 dB	400 Hz -10 dB	5 kHz -10 dB	3 kHz -10 dB	160 Hz -10 dB	80 Hz -10 dB
J-19-F2	400 Hz 0 dB	400 Hz -10 dB	10 kHz -10 dB	12.5 kHz -10 dB	7 kHz -10 dB	80 Hz -10 dB	40 Hz -10 dB
J-19-A2	12.5 kHz (-10 dB)						

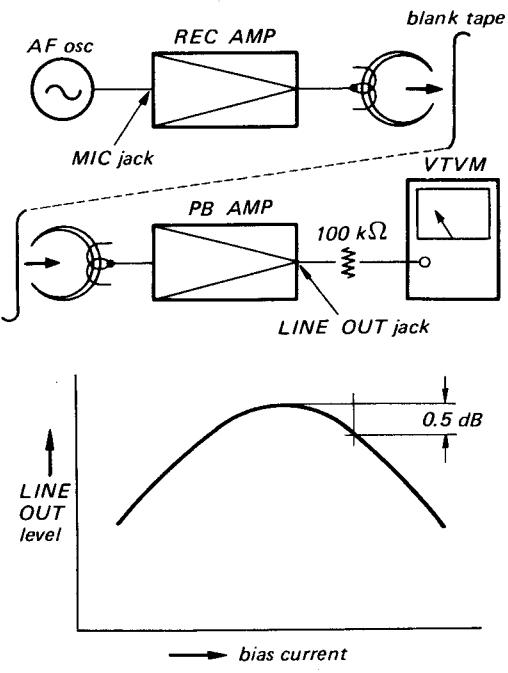
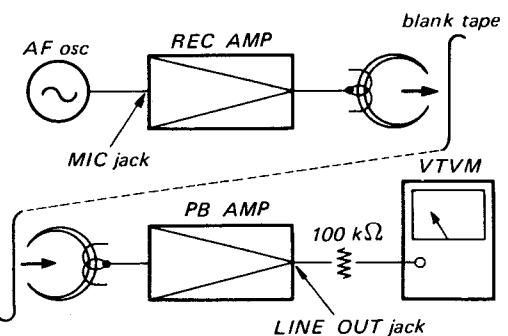


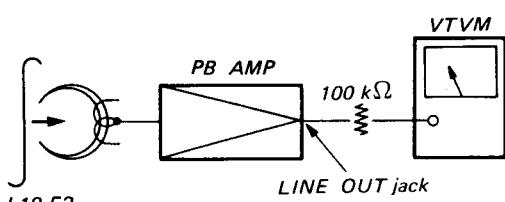
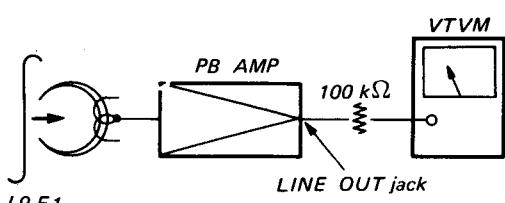
Adjusting parts locations

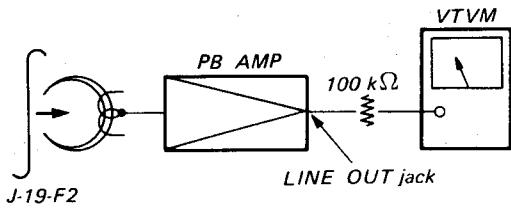
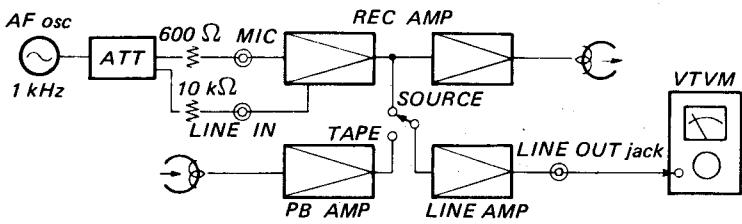
Items	Remarks	Procedure
1. DC Power Voltage Check	<p>Test Setup:</p> <p>Specification: <math>21.5 \pm 1</math> V dc      DC 50 V range</p>	<ol style="list-style-type: none"> <li>Turn on the power switch.</li> <li>Check for the reading on the dc voltmeter connected between the terminals 12 (+) and 7 (-) on the system control circuit board.</li> </ol>
2. Automatic Shut-off Switch Operation Check		<ol style="list-style-type: none"> <li>Turn on the power switch.</li> <li>Depress the play lever with the shut-off lever pushed by the hand.</li> <li>Make sure that the unit is set in the play mode.</li> <li>Release the shut-off lever. The play lever should be released and the set should be changed to the stop mode.</li> </ol>
3. Function Lever Check		<ol style="list-style-type: none"> <li>Turn off the power switch.</li> <li>Thread the tape along the tape path.</li> <li>Push the play lever (or both play and record levers)</li> <li>Turn on the power switch with ac 90 V power source.</li> <li>Make sure that the tape starts to run in the play (or record) mode.</li> </ol>

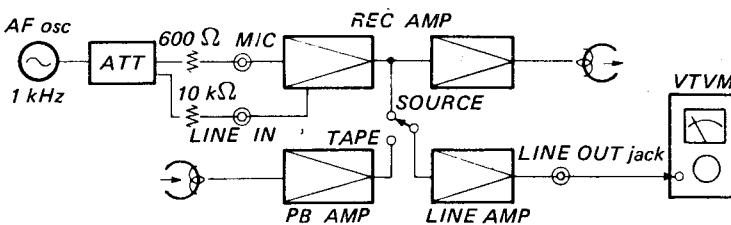
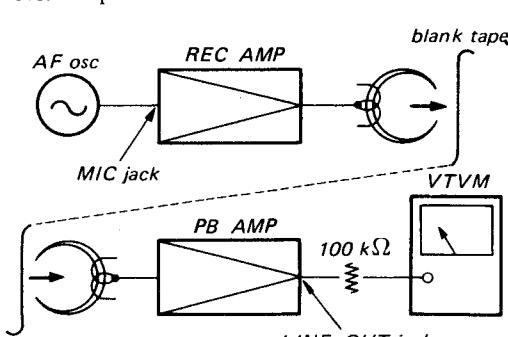
Items	Remarks	Procedure
4. PB Head Azimuth Adjustment	<p>Test Setup:</p>  <p>J-19-A2</p> <p>L-CH</p> <p>R-CH</p> <p>PB AMP</p> <p>REC head azimuth adjusting screws</p> <p>PB head azimuth adjusting screws</p> <p>* Screw position: Angle where the maximum output level is obtained</p> <p>* Phase difference between channels: Same phase at 400 Hz within 90° at 10 kHz</p>	<ol style="list-style-type: none"> <li>Play back the SONY alignment tape (J-19-A2).</li> <li>Adjust the adjusting screws for maximum playback output at both channels.</li> <li>Make sure that the same phase is obtained at 2nd tone (400 Hz) of the alignment tape (J-19-F2).</li> <li>When touching the tape near the playback head with a finger or a nonmetallic equipment, make sure it does not cause a higher output level.</li> </ol>  <p>same phase    45°    90°</p> <p>Lissajous figure on the oscilloscope</p>
5. VU Meter Calibration	<p>Test Setup:</p>  <p>J-19-F2</p> <p>PB AMP</p> <p>LINE OUT jack</p> <p>100 kΩ</p> <p>VTVM</p>	<ol style="list-style-type: none"> <li>Place the unit in the vertical position.</li> <li>Make sure that the pointer of the VU meter indicates -20 on the scale with no input signal in the play mode.</li> <li>Play back the first tone (400 Hz) of the SONY alignment tape (J-19-F2).</li> <li>Adjust the PB VOL control to obtain 0 dB (0.775 V) on the VTVM.</li> <li>Adjust R232 (R272) to obtain 0 VU on the level meter.</li> </ol> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>Gain margin of PB VOL control should be 6 to 8 dB.</li> <li>Do not turn the PB VOL control after the above step 4.</li> </ol>

Items	Remarks	Procedure
6. Azimuth Adjustments (Record Head)	<p>Test Setup:</p> 	<ol style="list-style-type: none"> <li>Thread a blank tape along the tape path.</li> <li>Deliver a 10 kHz signal of -80 dB (77.5 µV) to the MICROPHONE jack.</li> <li>Set the MONITOR switch to SOURCE.</li> <li>Record the signal on the blank tape.</li> <li>Adjust the azimuth adjusting screw for maximum reading on the VTVM.</li> <li>Make sure that the playback output is not increased when touching the tape near the record head with a finger or a nonmetallic rod.</li> </ol>
7. Trap Coil Adjustment & Bias Current Leakage Measurement	<p>Test Setup:</p>  <p>Specification:</p> <ul style="list-style-type: none"> <li>* Bias current leakage: Less than -40 dB</li> </ul>	<ol style="list-style-type: none"> <li>Place the unit in the record mode.</li> <li>Adjust C191 (C192) so that the VTVM connected across the record head reads approximately 10 V.</li> <li>Set the MIC VOL and LINE VOL controls extremely counterclockwise.</li> <li>Adjust L195 and L196 for the minimum reading on the VTVM connected to the check points.</li> <li>Measure the bias current leakage in the playback output without the tape threaded.</li> </ol> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>A shielded wire should not be used for the lead of VTVM.</li> <li>Use a nonmetallic screwdriver.</li> <li>The bias current leakage measurement is required for both stereo and monaural record modes.</li> <li>Check points: L-Ch : terminal (2) R-Ch : terminal (42) on the rec bias circuit board</li> </ol>

Items	Remarks	Procedure
8. Record Bias Adjustment	<p>Test Setup:</p>  <p>Graph showing LINE OUT level versus bias current. The curve peaks at 0.5 dB.</p>	<ol style="list-style-type: none"> <li>Thread a blank tape along the tape path.</li> <li>Set the MIC VOL and LINE VOL controls to the specified position on page 12.</li> <li>Turn the trimmer capacitors C91 and C92 clockwise to the full and turn them counterclockwise by three or four turns.</li> <li>Deliver a 1 kHz signal of -60 dB (0.775 mV) to the MICROPHONE jack.</li> <li>Record the signal on the blank tape.</li> <li>Turn C91 (C92) clockwise slowly until the VTVM reads a maximum.</li> <li>Turn C91 (C92) moreover until the VTVM reads 0.5 dB below the maximum reading.</li> <li>After adjustment, apply lock paint to the capacitors.</li> </ol>
9. Record Level Adjustment	<p>Test Setup:</p> 	<ol style="list-style-type: none"> <li>Thread a blank tape along the tape path.</li> <li>Set the MONITOR switch to SOURCE.</li> <li>Deliver a 1 kHz signal of -60 dB (0.775 mV) to the MICROPHONE jack.</li> <li>Adjust the MIC VOL control to obtain 0 dB (0.775 V) on the VTVM.</li> </ol> <p><b>Note:</b></p> <p>When changing the TAPE SELECT switch to SPECIAL, make sure that the output decreases approximately 1 to 1.5 dB.</p> <ol style="list-style-type: none"> <li>Change the MONITOR switch to TAPE.</li> <li>Record the signal on the blank tape.</li> <li>Adjust R115 (R155) to obtain 0 dB (0.775 V) on the VTVM.</li> </ol>

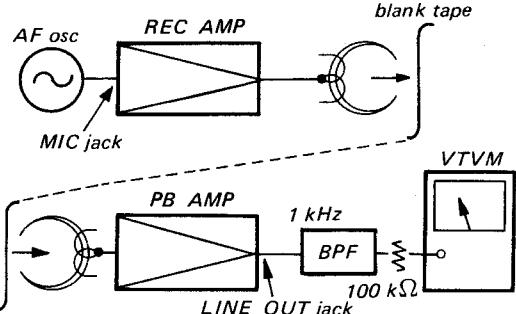
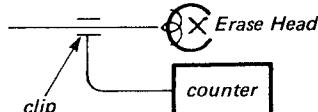
Items	Remarks	Procedure												
10. Playback Frequency Response Measurement 19 cm/s (7-1/2 ips)	<p>Test Setup:</p>  <p>Specification:</p> <table border="1" data-bbox="414 713 763 1124"> <thead> <tr> <th>tape tone</th> <th>level deviation against 2nd tone</th> </tr> </thead> <tbody> <tr> <td>3 rd (10 kHz)</td> <td>0 ± 1.5 dB</td> </tr> <tr> <td>4 th (12.5 kHz)</td> <td>0. ± 1.5 dB</td> </tr> <tr> <td>5th (7 kHz)</td> <td>0 ± 1.5 dB</td> </tr> <tr> <td>6th (80 Hz)</td> <td>+ 1.0 ± 2.0 dB</td> </tr> <tr> <td>7th (40 Hz)</td> <td>+ 1.0 ± 3.0 dB</td> </tr> </tbody> </table>	tape tone	level deviation against 2nd tone	3 rd (10 kHz)	0 ± 1.5 dB	4 th (12.5 kHz)	0. ± 1.5 dB	5th (7 kHz)	0 ± 1.5 dB	6th (80 Hz)	+ 1.0 ± 2.0 dB	7th (40 Hz)	+ 1.0 ± 3.0 dB	<ol style="list-style-type: none"> <li>Adjust R213 (R253) to obtain the same output between the 2nd (400 Hz) and 3rd (10 kHz) tones of the alignment tape (J-19-F2).</li> <li>Play the alignment tape (J-19-F2) from the 2nd tone to the 7th tone.</li> <li>Measure the deviation of each frequency against the 2nd tone.</li> <li>Make sure that the satisfied result is obtained.</li> </ol>
tape tone	level deviation against 2nd tone													
3 rd (10 kHz)	0 ± 1.5 dB													
4 th (12.5 kHz)	0. ± 1.5 dB													
5th (7 kHz)	0 ± 1.5 dB													
6th (80 Hz)	+ 1.0 ± 2.0 dB													
7th (40 Hz)	+ 1.0 ± 3.0 dB													
11. Playback Frequency Response Measurement 9.5 cm/s (3-3/4 ips)	<p>Test Setup:</p>  <p>Specification:</p> <table border="1" data-bbox="414 1558 732 1968"> <thead> <tr> <th>tape tone</th> <th>level deviation against 3rd tone</th> </tr> </thead> <tbody> <tr> <td>4th (5 kHz)</td> <td>0 ± 1.5 dB</td> </tr> <tr> <td>5th (3 kHz)</td> <td>0 ± 1.5 dB</td> </tr> <tr> <td>6th (160 Hz)</td> <td>0 ± 2 dB</td> </tr> <tr> <td>7th (80 Hz)</td> <td>0 ± 3 dB</td> </tr> </tbody> </table>	tape tone	level deviation against 3rd tone	4th (5 kHz)	0 ± 1.5 dB	5th (3 kHz)	0 ± 1.5 dB	6th (160 Hz)	0 ± 2 dB	7th (80 Hz)	0 ± 3 dB	<ol style="list-style-type: none"> <li>Adjust R214 (R254) to obtain the same output between the 3rd (400 Hz) and 4th (5 kHz) tones of the alignment tape (J-9-F1).</li> <li>Play the alignment tape (J-9-F1) from the 3rd tone to the 7th tone.</li> <li>Measure the deviation of each frequency against the 3rd tone.</li> <li>Make sure that the satisfied result is obtained.</li> </ol>		
tape tone	level deviation against 3rd tone													
4th (5 kHz)	0 ± 1.5 dB													
5th (3 kHz)	0 ± 1.5 dB													
6th (160 Hz)	0 ± 2 dB													
7th (80 Hz)	0 ± 3 dB													

Items	Remarks	Procedure				
12. Playback Signal-to-Noise Ratio	<p>Test Setup:</p>  <p>Specification:</p> <table border="0"> <tr> <td>7-1/2 ips (19 cm/s)</td> <td>..... more than 50 dB</td> </tr> <tr> <td>3-3/4 ips (9.5 cm/s)</td> <td>..... more than 48 dB</td> </tr> </table>	7-1/2 ips (19 cm/s)	..... more than 50 dB	3-3/4 ips (9.5 cm/s)	..... more than 48 dB	<ol style="list-style-type: none"> <li>Set the TAPE SPEED switch to 19 cm/s (7-1/2 ips).</li> <li>Play the 1st tone (400 Hz) of the SONY alignment tape (J-19-F2).</li> <li>Adjust the PB VOL control so that the VTVM will indicate 0 dB (0.775 V).</li> <li>Place the unit in the play mode without any tape.</li> </ol> <p><b>Note:</b></p> <p>Hold the shut-off lever so that the shut-off switch is activated (a rubber band or a piece of masking tape will hold the shut-off lever as though tape were threaded on the unit).</p> <ol style="list-style-type: none"> <li>Note the VTVM reading.</li> <li>Make sure that the difference between the above steps 2 and 4 is more than 50 dB.</li> <li>Set the TAPE SPEED switch to 9.5 cm/s (3-3/4 ips).</li> <li>Note the VTVM reading.</li> <li>Make sure that the difference between the above steps 2 and 8 is more than 50 dB.</li> </ol>
7-1/2 ips (19 cm/s)	..... more than 50 dB					
3-3/4 ips (9.5 cm/s)	..... more than 48 dB					
13. Input Level Variation Check	<p>Test Setup:</p>  <p>Specification:</p> <ul style="list-style-type: none"> <li>* MIC VOL ..... Less than 0.5 dB</li> <li>* LINE VOL ..... Less than 0.5 dB</li> </ul>	<p><i>Level variation by MIC VOL Control</i></p> <ol style="list-style-type: none"> <li>Set the LINE VOL control to the normal position.</li> <li>Deliver a 1 kHz signal of -10 dB (0.245 V) to the LINE INPUT jack.</li> <li>Check for the level variation on the VTVM by turning the MIC VOL control from MIN to MAX.</li> </ol> <p><i>Level variation by LINE VOL Control</i></p> <ol style="list-style-type: none"> <li>Set the MIC VOL control to the normal position.</li> <li>Deliver a 1 kHz signal of -60 dB (0.775 mV) to the MIC jack.</li> <li>Check for the level variation on the VTVM by turning the LINE VOL control from MIN to MAX.</li> </ol>				

Items	Remarks	Procedure
14. Minimum Input Level Check	<p>Test Setup:</p>  <p>Specification:</p> <ul style="list-style-type: none"> <li>* MIC jack Less than -72 dB (0.2 mV)</li> <li>* LINE INPUT jack Less than -22 dB (61 mV)</li> </ul>	<ol style="list-style-type: none"> <li>1. Set the MONITOR switch to SOURCE.</li> <li>2. Deliver a 1 kHz signal of -72 dB (0.2 mV) to the MICROPHONE jack.</li> <li>3. Set the LINE VOL control fully counterclockwise.</li> <li>4. Make sure that the line output is more than 0 dB on the VTVM when turning the MIC VOL control fully clockwise.</li> <li>5. Deliver a 1 kHz signal of -22 dB (61 mV) to the LINE INPUT jack.</li> <li>6. Set the MIC VOL control fully counterclockwise.</li> <li>7. Make sure that the line output is more than 0 dB on the VTVM when turning the LINE VOL control fully clockwise.</li> </ol>
15. Input and Output Check of REC/PB Connector (This check is applied for General Export model only)	<p>Test Setup:</p>  <p>Specification:</p> <p><math>0 \pm 2 \text{ dB} \quad (0.62 - 0.97 \text{ V})</math></p>	<ol style="list-style-type: none"> <li>1. Set the MIC VOL and LINE VOL controls to the normal position.</li> <li>2. Connect the audio oscillator to pin 1 (4) and 2 of the REC/PB connector.</li> <li>3. Deliver a 1 kHz signal of -34 dB (15.5 mV) from the audio oscillator.</li> <li>4. Place the unit in the record mode.</li> <li>5. Make sure that the VTVM reads 0 dB (0.775 V).</li> <li>6. Disconnect the VTVM from the LINE OUT jack and connect it to pin 3 (5) and 2 of the REC/PB connector.</li> <li>7. Play back the recorded tape.</li> <li>8. Make sure that the VTVM reads <math>0 \pm 2 \text{ dB}</math> (0.62 - 0.97 V).</li> </ol>

Items	Remarks	Procedure																								
16. Overall Frequency Response Adjustment (NORMAL)	<p><b>Test Setup:</b></p> <p><b>Specification:</b></p> <table border="1"> <thead> <tr> <th>speed tone</th> <th>7-1/2 ips (19 cm/s)</th> <th>3-3/4 ips (9.5 cm/s)</th> </tr> </thead> <tbody> <tr> <td>50 Hz</td> <td><math>\pm 3</math> dB</td> <td><math>\pm 3</math> dB</td> </tr> <tr> <td>100 Hz</td> <td><math>\pm 3</math> dB</td> <td><math>\pm 3</math> dB</td> </tr> <tr> <td>1 kHz</td> <td></td> <td></td> </tr> <tr> <td>5 kHz</td> <td><math>\pm 3</math> dB</td> <td><math>\pm 3</math> dB</td> </tr> <tr> <td>10 kHz</td> <td><math>\pm 3</math> dB</td> <td><math>\pm 3</math> dB</td> </tr> <tr> <td>15 kHz</td> <td><math>\pm 3</math> dB</td> <td>-</td> </tr> <tr> <td>18 kHz</td> <td>+3 dB -15dB</td> <td>-</td> </tr> </tbody> </table>	speed tone	7-1/2 ips (19 cm/s)	3-3/4 ips (9.5 cm/s)	50 Hz	$\pm 3$ dB	$\pm 3$ dB	100 Hz	$\pm 3$ dB	$\pm 3$ dB	1 kHz			5 kHz	$\pm 3$ dB	$\pm 3$ dB	10 kHz	$\pm 3$ dB	$\pm 3$ dB	15 kHz	$\pm 3$ dB	-	18 kHz	+3 dB -15dB	-	<ol style="list-style-type: none"> <li>Thread a blank tape along the tape path.</li> <li>Set the TAPE SELECT switch to NORMAL.</li> <li>Set the MIC VOL and LINE VOL controls to the specified position on page 12.</li> <li>Record the following frequency signals of -80 dB (77.5 µV): 50 Hz, 100 Hz, 1 kHz, 5 kHz, 10 kHz, 15 kHz and 18 kHz through the MICROPHONE jack.</li> <li>Make sure that each deviation in the level for a 1 kHz signal is within the specification.</li> <li>If it is not, perform the record bias adjustment.</li> </ol>
speed tone	7-1/2 ips (19 cm/s)	3-3/4 ips (9.5 cm/s)																								
50 Hz	$\pm 3$ dB	$\pm 3$ dB																								
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17. Overall Frequency Response Adjustment (SPECIAL)	<p><b>Test Setup:</b></p> <p><b>Specification:</b></p> <table border="1"> <thead> <tr> <th>speed tone</th> <th>7-1/2 ips (19 cm/s)</th> <th>3-3/4 ips (9.5 cm/s)</th> </tr> </thead> <tbody> <tr> <td>50 Hz</td> <td><math>\pm 3</math> dB</td> <td><math>\pm 3</math> dB</td> </tr> <tr> <td>100 Hz</td> <td><math>\pm 3</math> dB</td> <td><math>\pm 3</math> dB</td> </tr> <tr> <td>1 kHz</td> <td></td> <td></td> </tr> <tr> <td>5 kHz</td> <td><math>\pm 3</math> dB</td> <td><math>\pm 3</math> dB</td> </tr> <tr> <td>10 kHz</td> <td><math>\pm 3</math> dB</td> <td><math>\pm 3</math> dB</td> </tr> <tr> <td>15 kHz</td> <td><math>\pm 3</math> dB</td> <td><math>\pm 3</math> dB</td> </tr> <tr> <td>18 kHz</td> <td><math>\pm 3</math> dB</td> <td>-</td> </tr> </tbody> </table>	speed tone	7-1/2 ips (19 cm/s)	3-3/4 ips (9.5 cm/s)	50 Hz	$\pm 3$ dB	$\pm 3$ dB	100 Hz	$\pm 3$ dB	$\pm 3$ dB	1 kHz			5 kHz	$\pm 3$ dB	$\pm 3$ dB	10 kHz	$\pm 3$ dB	$\pm 3$ dB	15 kHz	$\pm 3$ dB	$\pm 3$ dB	18 kHz	$\pm 3$ dB	-	<ol style="list-style-type: none"> <li>Thread a blank tape (SONY SLH tape) along the tape path.</li> <li>Set the TAPE SELECT switch to SPECIAL.</li> <li>Set the MIC VOL and LINE VOL controls to the specified position on page 12.</li> <li>Record the following frequency signals of -80 dB (77.5 µV): 50 Hz, 100 Hz, 1 kHz, 5 kHz, 10 kHz, 15 kHz and 18 kHz through the MICROPHONE jack.</li> <li>Make sure that each deviation in the level for a 1 kHz signal is within the specification.</li> <li>If it is not, perform the record bias adjustment.</li> </ol>
speed tone	7-1/2 ips (19 cm/s)	3-3/4 ips (9.5 cm/s)																								
50 Hz	$\pm 3$ dB	$\pm 3$ dB																								
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15 kHz	$\pm 3$ dB	$\pm 3$ dB																								
18 kHz	$\pm 3$ dB	-																								

Items	Remarks	Procedure								
18. Overall Signal-to-Noise Ratio Measurement	<p>Test Setup:</p> <p>NORMAL (standard tape):</p> <table border="0"> <tr> <td>7-1/2 ips (19 cm/s)</td> <td>3-3/4 ips (9.5 cm/s)</td> </tr> <tr> <td>46 dB</td> <td>44 dB</td> </tr> </table> <p>SPECIAL (SONY SLH tape):</p> <table border="0"> <tr> <td>7-1/2 ips (19 cm/s)</td> <td>3-3/4 ips (9.5 cm/s)</td> </tr> <tr> <td>48 dB</td> <td>46 dB</td> </tr> </table>	7-1/2 ips (19 cm/s)	3-3/4 ips (9.5 cm/s)	46 dB	44 dB	7-1/2 ips (19 cm/s)	3-3/4 ips (9.5 cm/s)	48 dB	46 dB	<ol style="list-style-type: none"> <li>Thread a blank tape along the tape path.</li> <li>Deliver a 1 kHz signal of -60 dB (0.775 mV) to the MIC jack.</li> <li>Place the unit in the record mode.</li> <li>Record the signal for a minute.</li> <li>Disconnect the audio oscillator, and terminate the MIC jack with a dummy resistor of 600 Ω.</li> <li>Keep the unit in the record mode with no input signal.</li> <li>Playback the signal recorded portion and no signal recorded portion.</li> <li>Make sure that the difference between the two recorded portions of the tape is more than the specification.</li> </ol> <p><b>Note:</b> When using an SLH tape, set the TAPE SELECT SWITCH to SPECIAL.</p>
7-1/2 ips (19 cm/s)	3-3/4 ips (9.5 cm/s)									
46 dB	44 dB									
7-1/2 ips (19 cm/s)	3-3/4 ips (9.5 cm/s)									
48 dB	46 dB									
19. Overall Distortion Check	<p>Test Setup:</p> <p>Specification:</p> <p>7-1/2 ips: Less than 1.5 %</p> <p>3-3/4 ips: Less than 2 %</p>	<ol style="list-style-type: none"> <li>Thread a blank tape along the tape path.</li> <li>Deliver a 1 kHz signal of -60 dB (0.775 mV) to the MIC jack.</li> <li>Place the unit in the normal record mode.</li> <li>Check the reading on the distortion meter.</li> </ol>								

Items	Remarks	Procedure
20. Erase Ratio Measurement	<p>Test Setup:</p>  <p>Specification: more than 65 dB (with SONY SLH tape)</p>	<ol style="list-style-type: none"> <li>Thread a blank tape (SONY SLH tape) along the tape path.</li> <li>Set the TAPE SELECT switch to SPECIAL.</li> <li>Set the MIC VOL and LINE VOL controls to the specified position on page 12.</li> <li>Deliver a 1 kHz signal of -50 dB (2.45 mV) to the MIC jack.</li> <li>Place the unit in the stereo-record mode.</li> <li>Rewind a half of recorded tape.</li> <li>Disconnect the audio oscillator.</li> <li>Terminate the MIC jack with a <math>600 \Omega</math> resistor.</li> <li>Erase the tape in the record mode with no input signal.</li> <li>Rewind again to the beginning of the recorded portion.</li> <li>Play back the tape.</li> <li>Make sure that the difference between the two portions is more than 65 dB on the VTVM.</li> </ol>
21. Erase Head Dummy Coil Adjustment	<p>Test Setup:</p> 	<ol style="list-style-type: none"> <li>Unsolder the erase head lead wires.</li> <li>Connect the frequency counter across the lead wires.</li> <li>Place the unit in the stereo-record mode.</li> <li>Make sure that the counter indicates <math>120 \text{ kHz} \pm 10\%</math>.</li> <li>Place the L-CH (R-CH) only in the record mode.</li> <li>Adjust L187 (L188) to obtain the same reading as obtained in the step 4.</li> </ol>

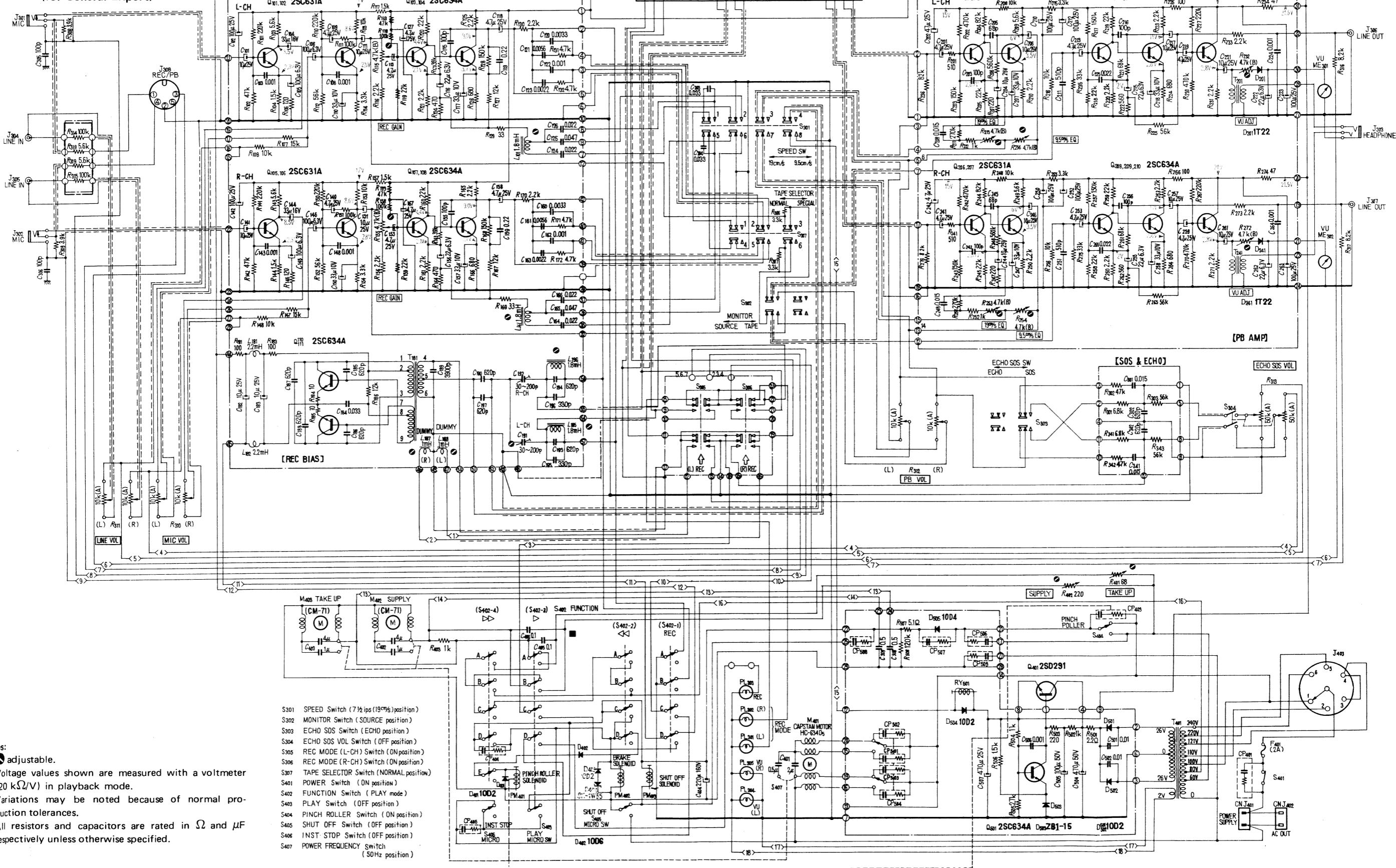
	Remarks	Procedure
22. Crosstalk Measurement (between channels)	<p>Test Setup:</p> <p>Specification:</p> <p>More than 55 dB (with SONY SLH tape)</p>	<ol style="list-style-type: none"> <li>Thread a blank tape (SONY SLH tape) along the tape path.</li> <li>Set the MIC VOL and LINE VOL controls to the specified position on page 12.</li> <li>Deliver a 1 kHz signal of -50 dB (2.45 mV) to the L-CH (R-CH) MIC jack only.</li> <li>Make sure that the level difference between both channels is more than 55 dB.</li> </ol> <p><b>Note:</b></p> <p>Use the tape completely erased.</p>
23. Crosstalk Measurement (between tracks)	<p>Test Setup:</p> <p>Specification:</p> <p>More than 55 dB (with SONY SLH tape)</p>	<ol style="list-style-type: none"> <li>Thread a blank tape (SONY SLH tape) along the tape path.</li> <li>Set the TAPE SELECT switch to SPECIAL.</li> <li>Set the MIC VOL and LINE VOL controls to the specified position on page 12.</li> <li>Deliver a 1 kHz signal of -50 dB (2.45 mV) to the MIC jack.</li> <li>Place the unit in the stereo-record mode.</li> <li>Note the VTVM reading.</li> <li>Reverse the tape reels.</li> <li>Play back the opposite tracks of the recorded tape.</li> <li>Note the VTVM reading.</li> <li>Make sure that the level difference between step 6 and 9 is more than 55 dB.</li> </ol>

Items	Remarks	Procedure
24. SOS Check		<ol style="list-style-type: none"> <li>1. Thread a blank tape along the tape path.</li> <li>2. Set the MONITOR switch to TAPE.</li> <li>3. Set the PB VOL controls to the specified position on page 12.</li> <li>4. Deliver a 1 kHz signal of -60 dB (0.775 mV) to the L-CH (R-CH) MIC jack only.</li> <li>5. Rewind the tape to the beginning.</li> <li>6. Set the SOS &amp; ECHO switch to SOS.</li> <li>7. Place the R-CH (L-CH) only in the record mode.</li> <li>8. Check to see that R-CH (L-CH) output level becomes the same as L-CH (R-CH) output level by adjusting the SOS &amp; ECHO VOL control.</li> </ol>
25. ECHO Check		<ol style="list-style-type: none"> <li>1. Thread a blank tape along the tape path.</li> <li>2. Set the SOS &amp; ECHO switch to ECHO.</li> <li>3. Deliver a 1 kHz signal of -60 dB (0.775 mV) to the MIC jack.</li> <li>4. Place the unit in the record mode.</li> <li>5. Check to see that echo level increases as the SOS &amp; ECHO VOL control is turned clockwise.</li> <li>6. Check to see that oscillation does not occur when turning the PB VOL control fully clockwise.</li> </ol> <p><b>Note:</b></p> <p>The adjustment is required for both channels.</p>

## **SECTION 6**

## **DIAGRAMS**

## **6-1. SCHEMATIC DIAGRAM (for General Export)**



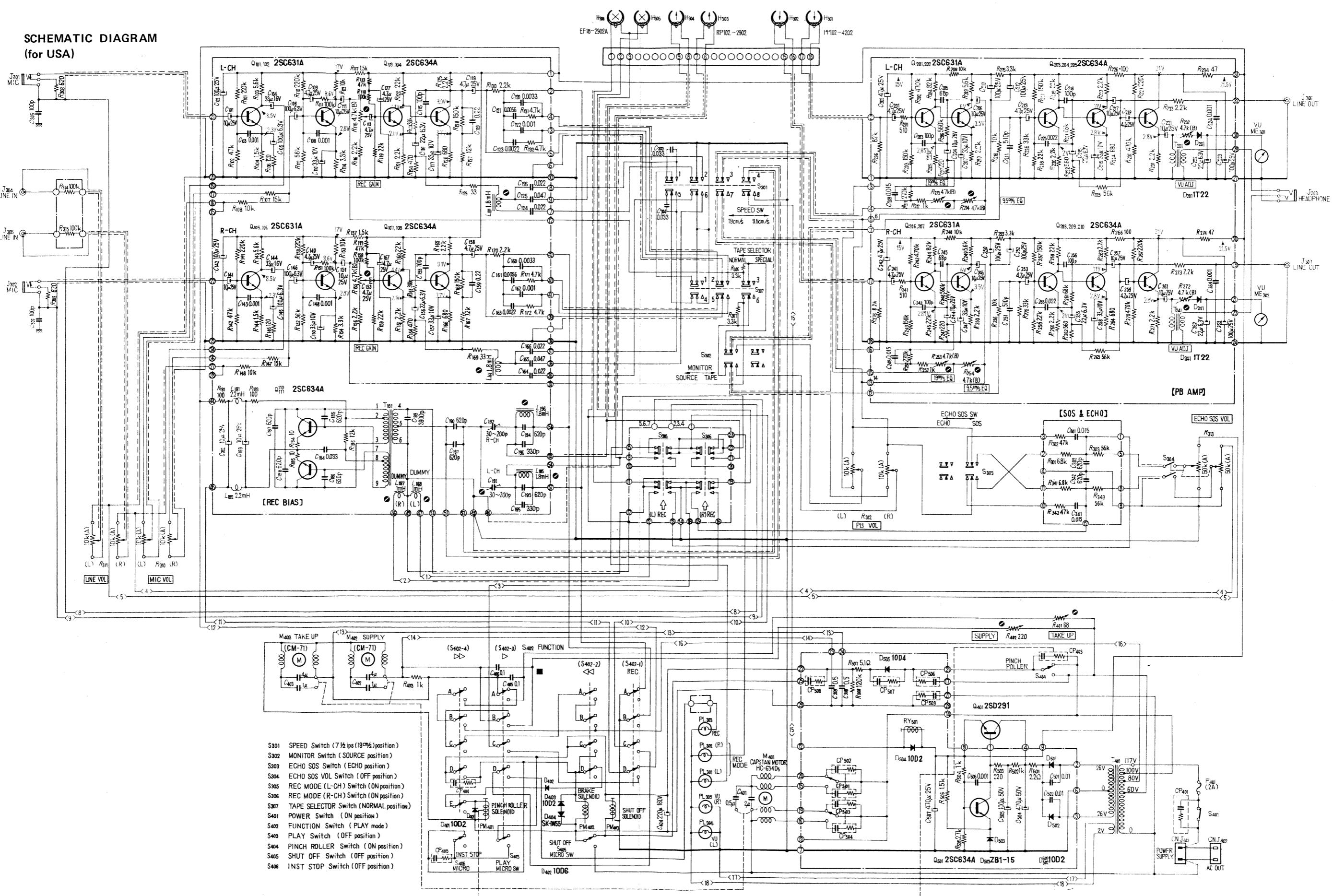
## Notes:

1. adjustable.
  2. Voltage values shown are measured with a voltmeter (20 kΩ/V) in playback mode.  
Variations may be noted because of normal production tolerances.
  3. All resistors and capacitors are rated in Ω and μF respectively unless otherwise specified.

S305 REC MODE (L-CH) Switch (ON position)  
 S306 REC MODE (R-CH) Switch (ON position)  
 S307 TAPE SELECTOR Switch (NORMAL position)  
 S401 POWER Switch (ON position)  
 S402 FUNCTION Switch (PLAY mode)  
 S403 PLAY Switch (OFF position)  
 S404 PINCH ROLLER Switch (ON position)  
 S405 SHUT OFF Switch (OFF position)  
 S406 INST STOP Switch (OFF position)  
 S407 POWER FREQUENCY Switch  
     (50Hz position)

# TC-640 TC-640

**SCHEMATIC DIAGRAM**  
(for USA)

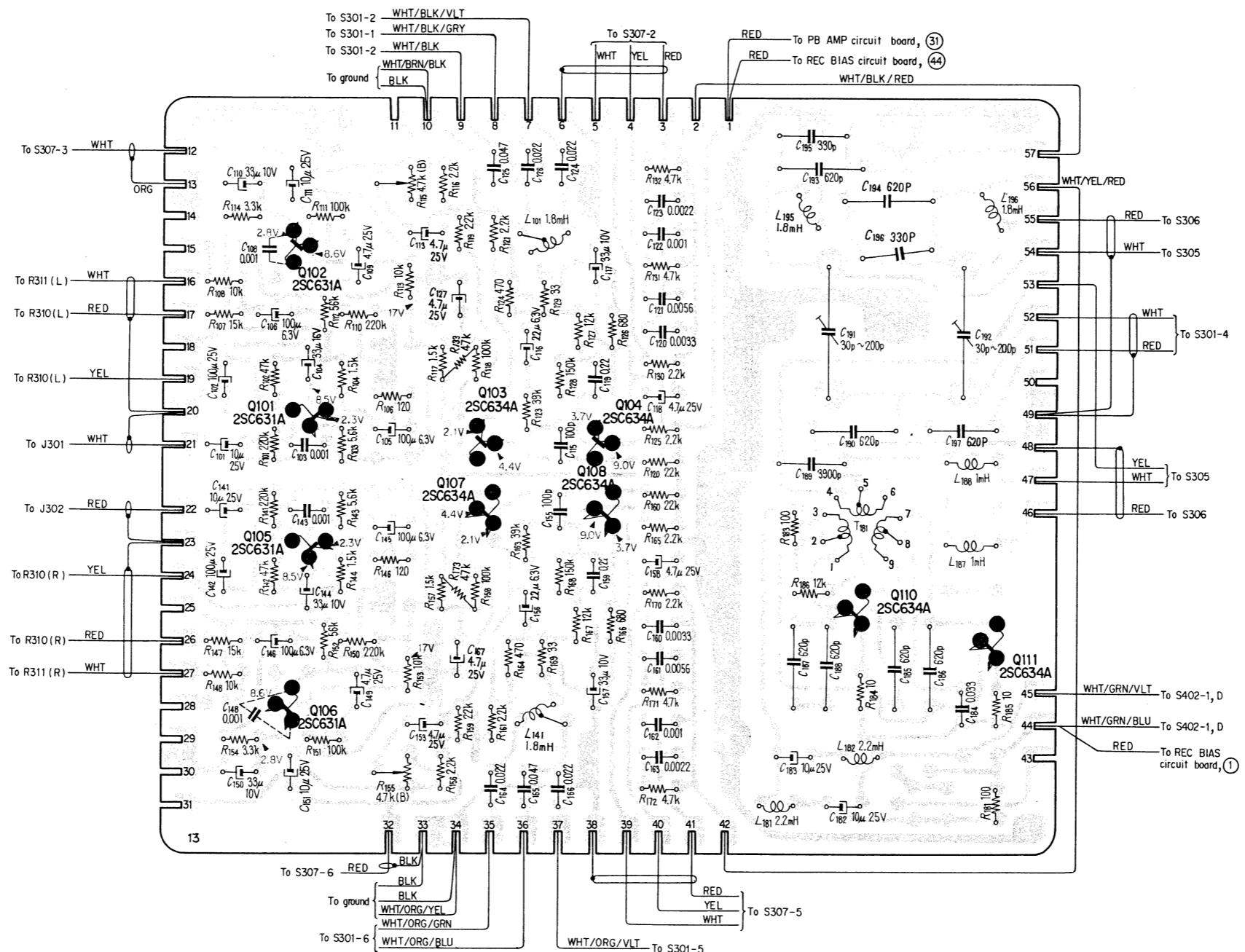


# TC-640      TC-640

## 6-2. MOUNTING DIAGRAM

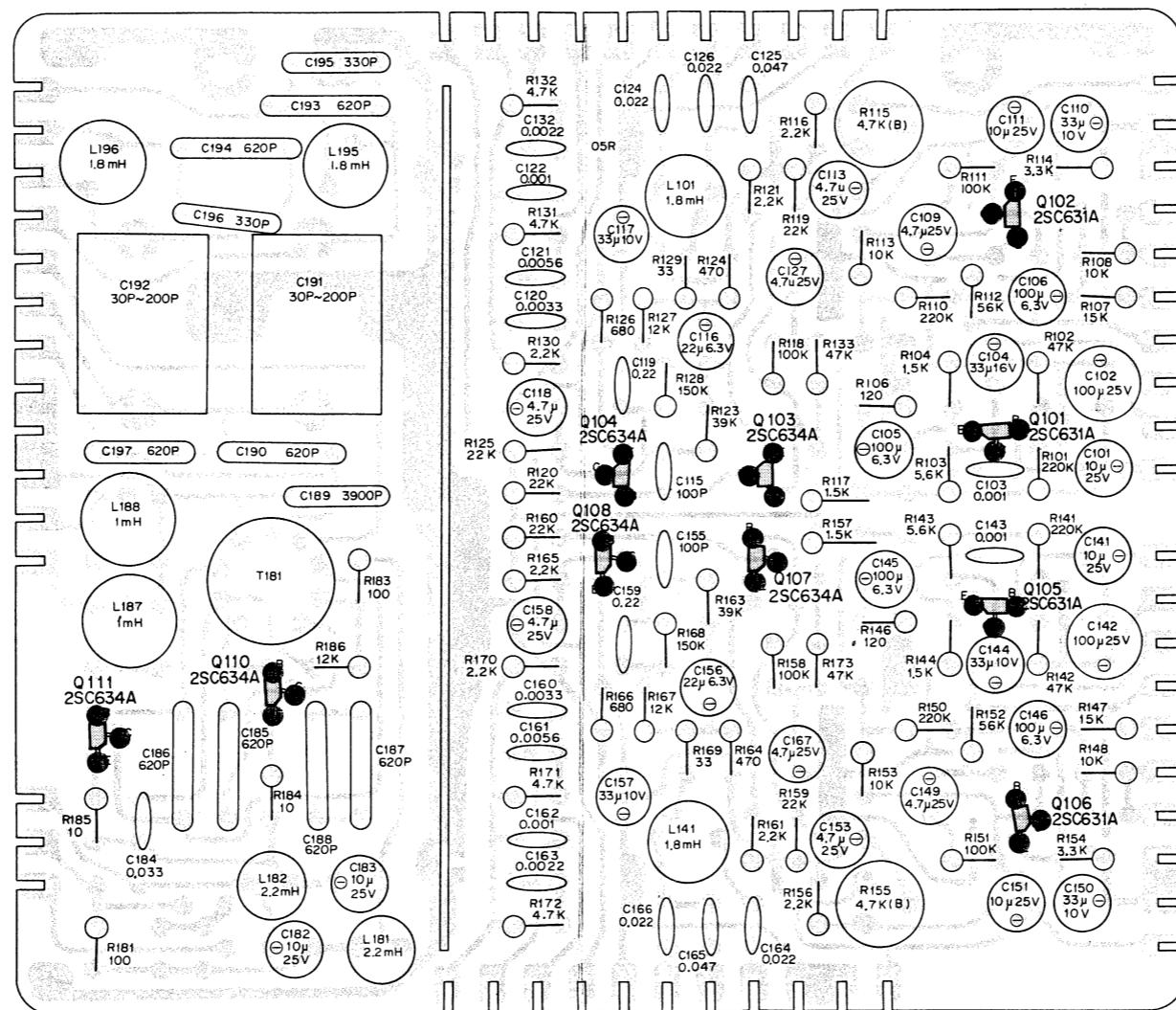
### 6-2-1. REC BIAS Circuit Board

*Conductor Side*



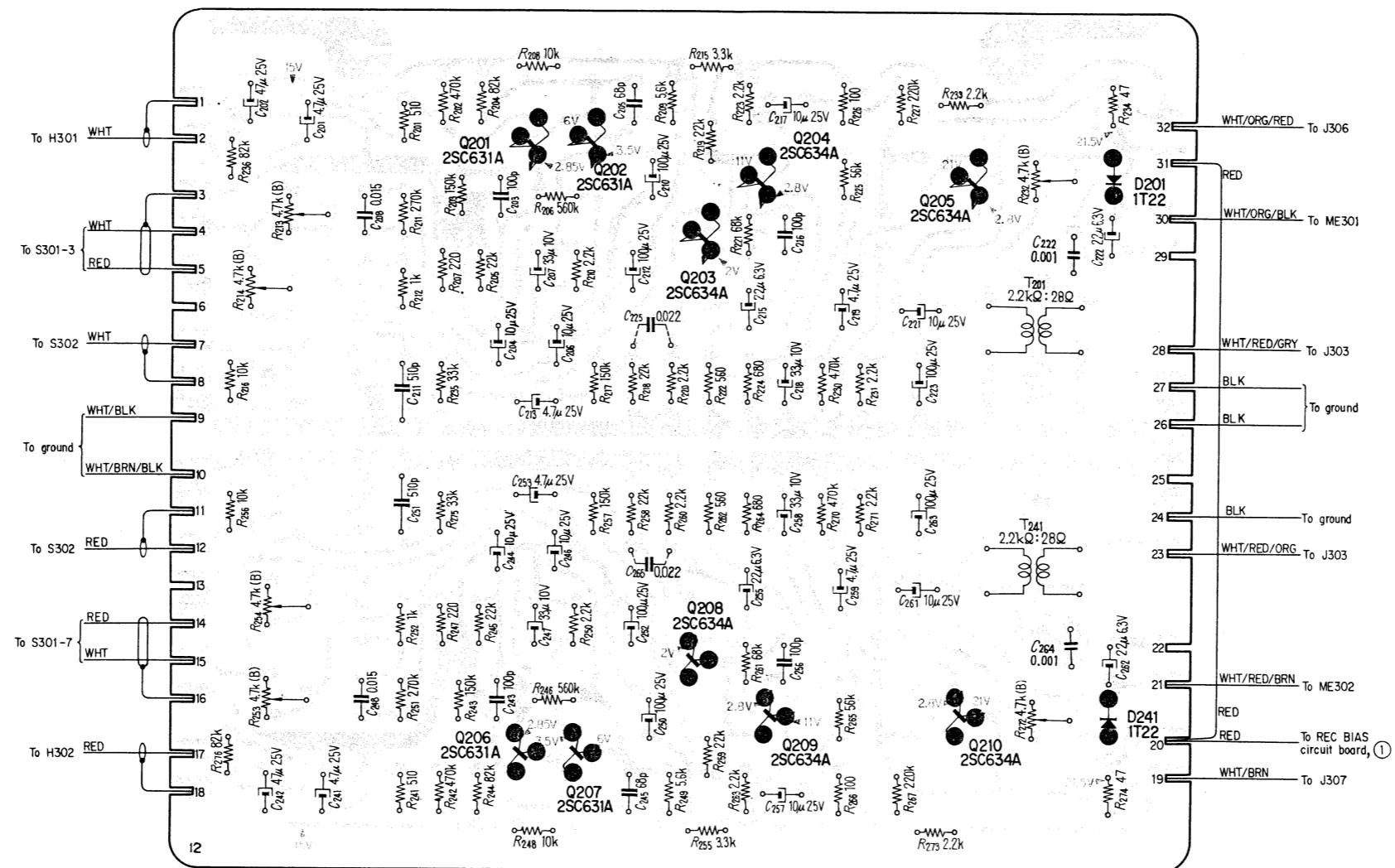
## **TC-640**

**REC BIAS Circuit Board**  
— *Component Side* —



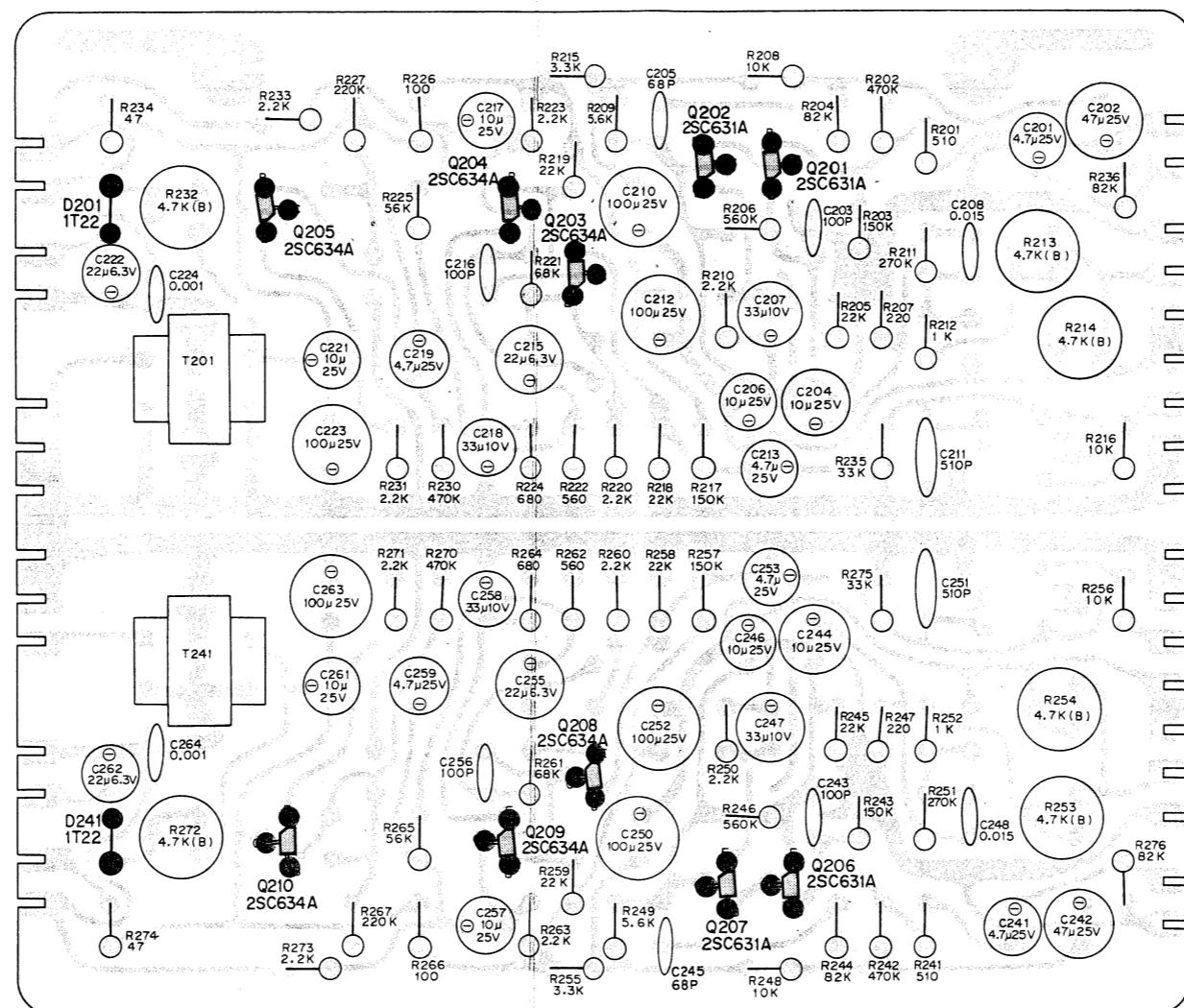
# **TC-640**

## **6-2-2. PB AMP Circuit Board —Conductor Side—**



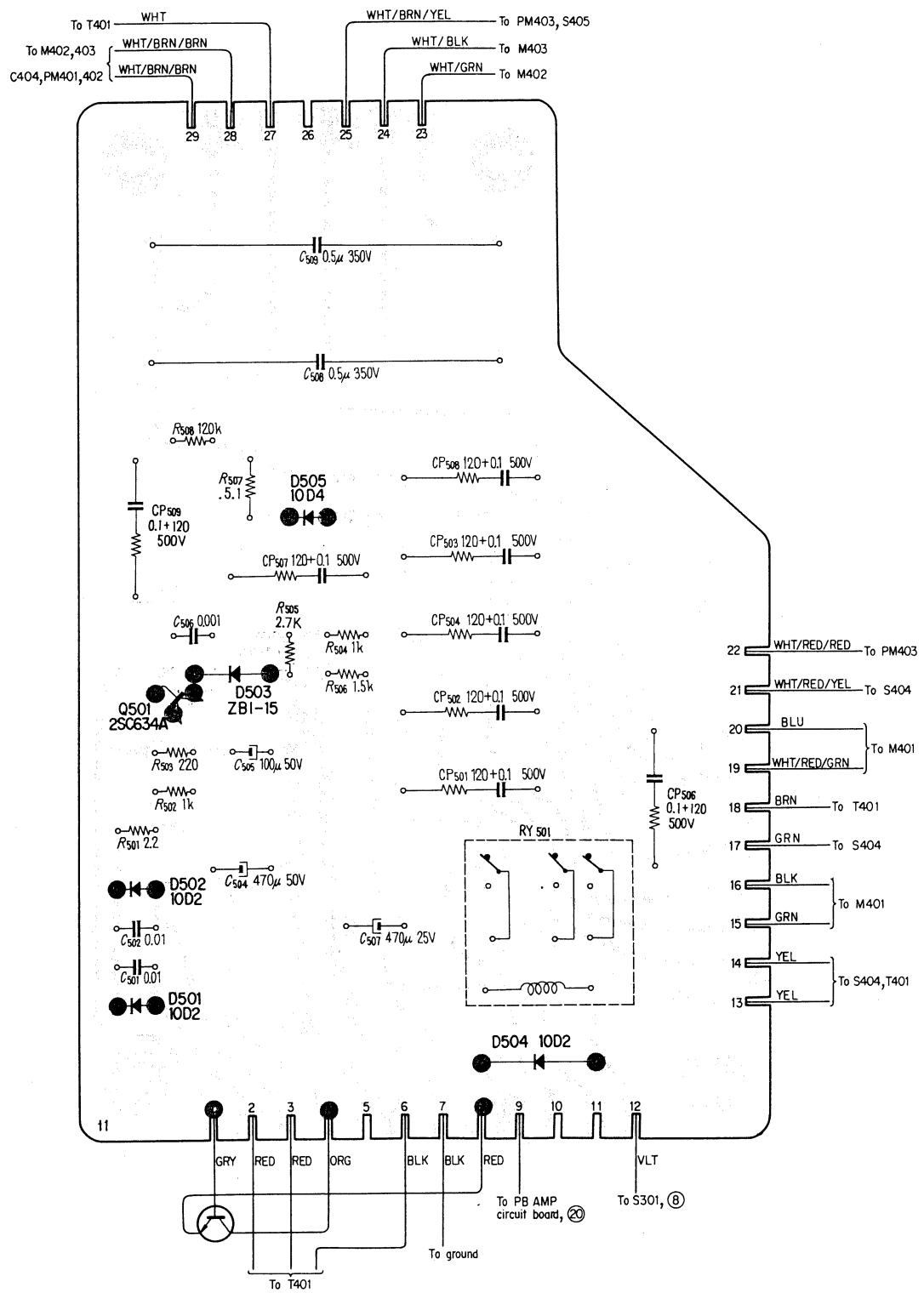
**TC-640**      **TC-640**

**PB AMP Circuit Board**  
— Component Side —



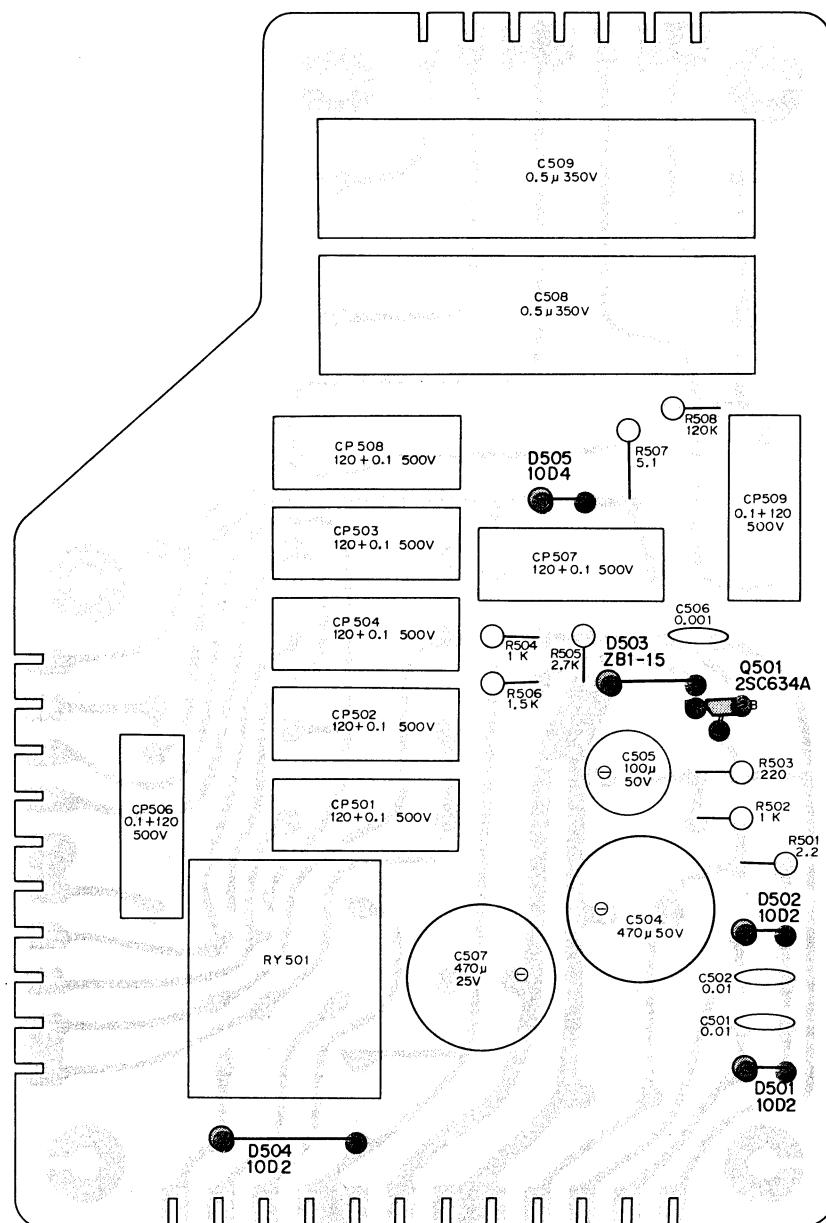
### 6-2-3. System Control Circuit Board

— Conductor Side —



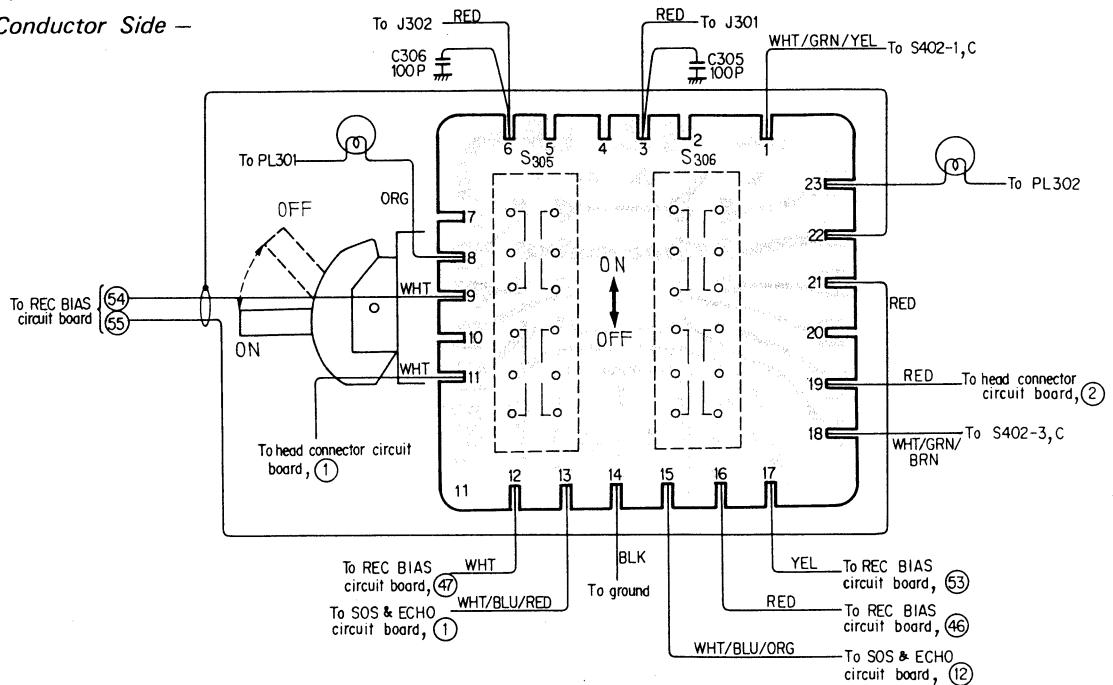
**System Control Circuit Board**

— Component Side —



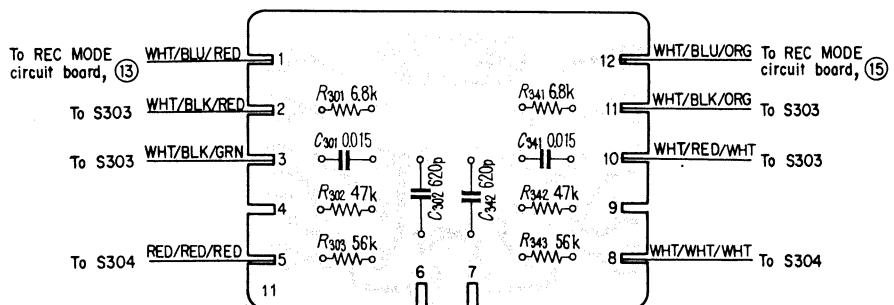
### 6-2-4. REC MODE Circuit Board

— Conductor Side —

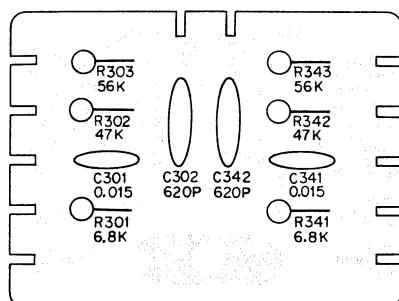


### 6-2-5. SOS & ECHO Circuit Board

— Conductor Side —

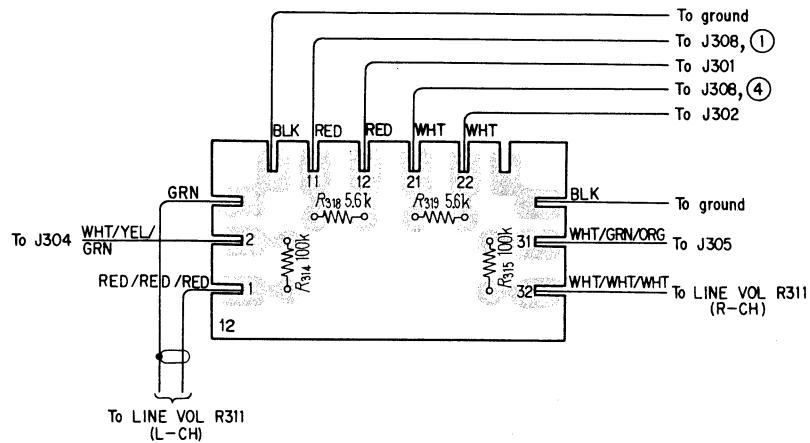


— Component Side —

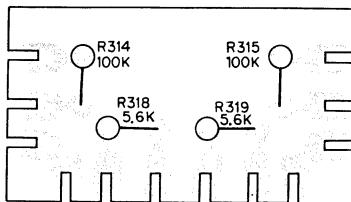


### 6-2-6. Resistor Terminal Circuit Board (for General Export)

*— Conductor Side —*

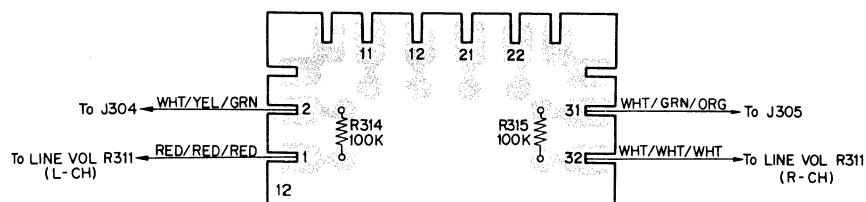


*— Component Side —*

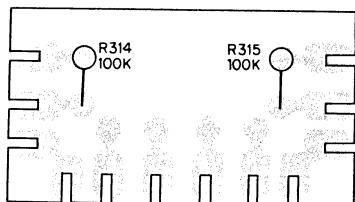


### Resistor Terminal Circuit Board (for USA)

*— Conductor Side —*

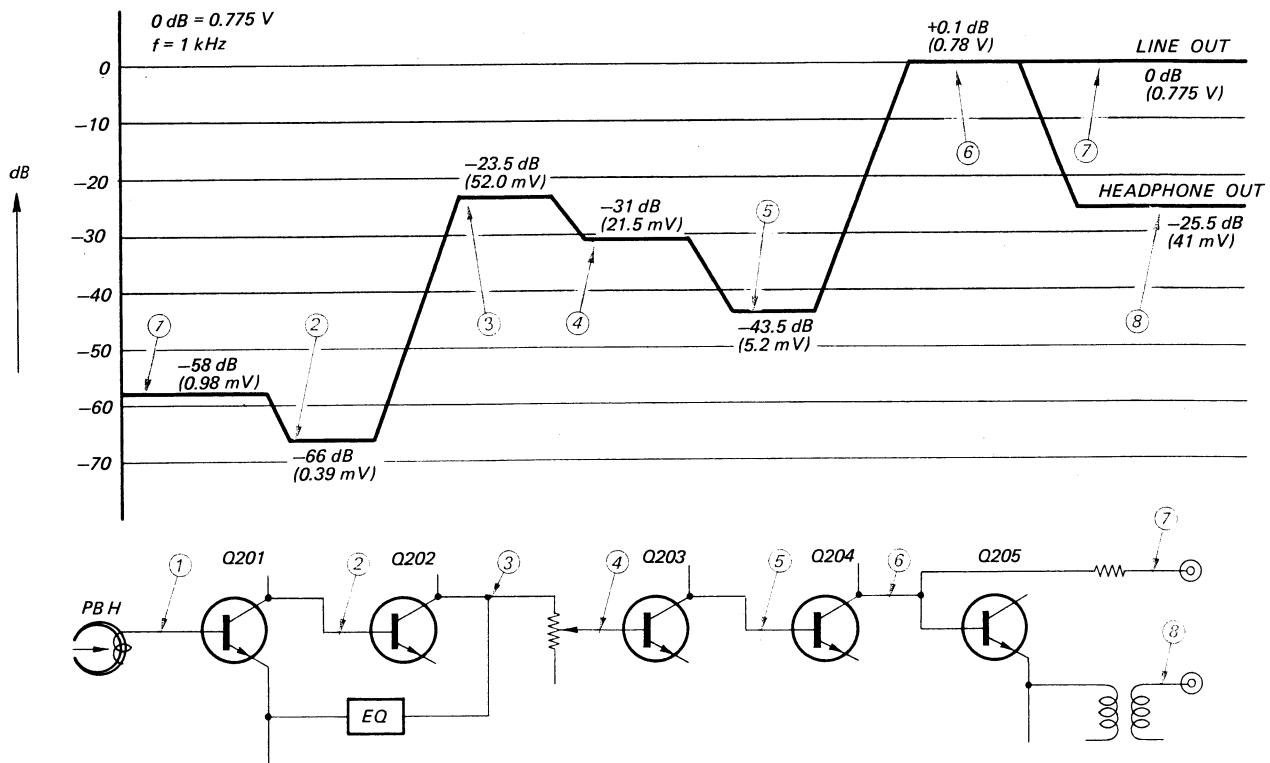


*— Component Side —*

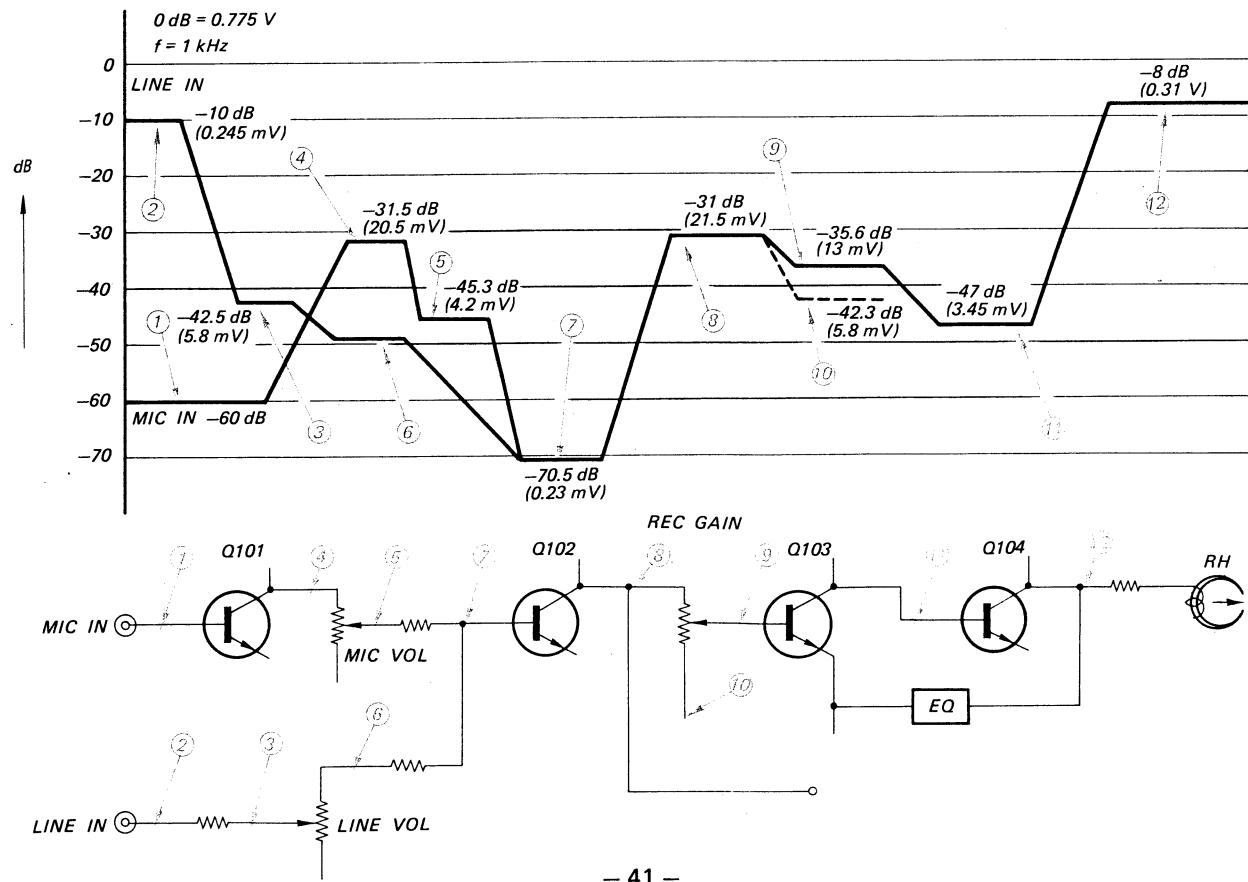


### 6.3. LEVEL DIAGRAM

#### Playback

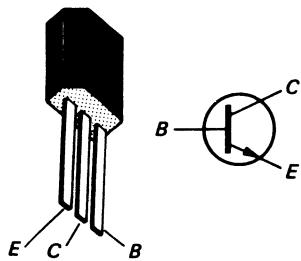


#### Record

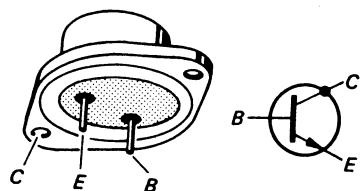


**SECTION 7**  
**SEMICONDUCTOR ELECTRODES**

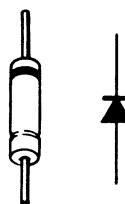
2SC631A, 2SC634A



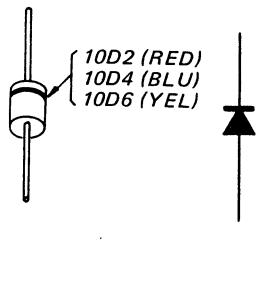
2SD291



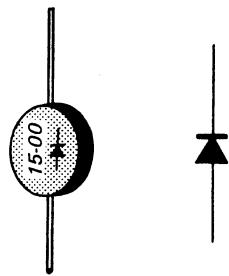
1T22



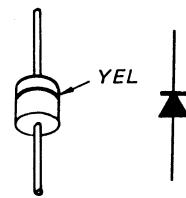
10D2, 10D4, 10D6



ZB1-15



SK-1W55



**TC-640**      **TC-640**

## **SECTION 8**

### **ELECTRICAL PARTS LIST**

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
<b>MOUNTED CIRCUIT BOARD</b>			C107, 147		- discarded -	R112, 152	1-242-715	56 kΩ	C204, 244	1-121-398	10 25 V elect
X-31440-51	REC BIAS		C108, 148	1-105-661-12	0.001 50 V mylar	R113, 153	1-242-697	10 kΩ	C205, 245	1-107-127	68 p 50 V silvered mica
X-31440-52	PB AMP		C109, 149	1-121-395	4.7 25 V elect	R114, 154	1-242-685	3.3 kΩ	C206, 246	1-121-398	10 25 V elect
X-31440-53	system control		C110, 150	1-121-402	33 10 V elect	R115, 155	1-221-978	4.7 kΩ (B) semi-fixed REC GAIN	C207, 247	1-121-402	33 10 V elect
X-31440-54	SOS & ECHO		C111, 151	1-121-398	10 25 V elect	R116, 156	1-242-681	2.2 kΩ	C208, 248	1-105-675-12	0.015 50 V mylar
X-31440-55	REC MODE		C112, 152		- discarded -	R117, 157	1-242-677	1.5 kΩ	C209, 249		- discarded -
X-31440-56	resistor terminal		C113, 153	1-121-395	4.7 25 V elect	R118, 158	1-242-721	100 kΩ	C210, 250	1-121-416	100 25 V elect
<b>PRINTED CIRCUIT BOARD</b>			C114, 154		- discarded -	R119, 159	1-242-705	22 kΩ	C211, 251	1-107-245	510 p 50 V silvered mica
1-539-435	resistor terminal		C115, 155	1-107-131	100 p 50 V silvered mica	R120, 160	1-242-705	22 kΩ	C212, 252	1-121-416	100 25 V elect
1-539-787	SOS & ECHO		C116, 156	1-121-476	22 6.3 V elect	R121, 161	1-242-681	2.2 kΩ	C213, 253	1-121-395	4.7 25 V elect
1-539-815	PB AMP		C117, 157	1-121-402	33 10 V elect	R122, 162		- discarded -	C214, 254		- discarded -
1-539-816	REC BIAS		C118, 158	1-121-395	4.7 25 V elect	R123, 163	1-242-711	39 kΩ	C215, 255	1-121-476	22 6.3 V elect
1-539-817	system control		C119, 159	1-105-689-12	0.22 50 V mylar	R124, 164	1-242-665	470 Ω	C216, 256	1-107-131	100 p 50 V silvered mica
1-539-867	REC MODE		C120, 160	1-105-667-12	0.0033 50 V mylar	R125, 165	1-242-681	2.2 kΩ	C217, 257	1-121-398	10 25 V elect
1-581-020	head connector		C121, 161	1-105-670-12	0.0056 50 V mylar	R126, 166	1-242-669	680 Ω	C218, 258	1-121-402	33 10 V elect
<b>REC BIAS CIRCUIT</b>			C122, 162	1-105-661-12	0.001 50 V mylar	R127, 167	1-242-699	12 kΩ	C219, 259	1-121-395	4.7 25 V elect
<b>SEMICONDUCTORS</b>			C123, 163	1-105-665-12	0.0022 50 V mylar	R128, 168	1-242-725	150 kΩ	C220, 260		- discarded -
Q101, 105	transistor	2SC631A	C124, 164	1-105-677-12	0.022 50 V mylar	R129, 169	1-242-637	33 Ω	C221, 261	1-121-398	10 25 V elect
Q102, 106	transistor	2SC631A	C125, 165	1-105-681-12	0.047 50 V mylar	R130, 170	1-242-681	2.2 kΩ	C222, 262	1-121-476	22 6.3 V elect
Q103, 107	transistor	2SC634A	C126, 166	1-105-677-12	0.022 50 V mylar	R131, 171	1-242-689	4.7 kΩ	C223, 263	1-121-416	100 25 V elect
Q104, 108	transistor	2SC634A	C127, 167	1-121-395	4.7 25 V elect	R132, 172	1-242-689	4.7 kΩ	C224, 264	1-105-661-12	0.001 50 V mylar
Q110	transistor	2SC634A	C182	1-121-398	10 25 V elect	R133, 173	1-242-713	47 kΩ	C225, 265	1-105-677-12	0.022 50 V mylar
Q111	transistor	2SC634A	C183	1-121-398	10 25 V elect	<b>RESISTORS</b>			<b>RESISTORS</b>		
<b>COILS AND TRANSFORMERS</b>			C184	1-105-679-12	0.033 50 V mylar	R181	1-242-649	100 Ω			
L101	1-231-069	coil, 1.8 mH	C185	1-107-028	620 p 500 V silvered mica	R182		- discarded -	All resistors are 1/4W and carbon type, unless otherwise indicated.		
L141	1-231-069	coil, 1.8 mH	C186	1-107-028	620 p 500 V silvered mica	R183	1-242-649	100 Ω			
L181	1-407-198	coil, micro inductor ; 2.2 mH	C187	1-107-028	620 p 500 V silvered mica	R184	1-242-625	10 Ω			
L182	1-407-198	coil, micro inductor ; 2.2 mH	C188	1-107-028	620 p 500 V silvered mica	R185	1-242-625	10 Ω	R201, 241	1-242-666	510 Ω
L187	1-409-038	coil, dummy ; 1 mH	C189	1-109-508	3900 p 500 V dipped mica	R186	1-242-699	12 kΩ	R202, 242	1-242-737	470 kΩ
L188	1-409-038	coil, dummy ; 1 mH	C190	1-107-028	620 p 500 V silvered mica	<b>PB AMP CIRCUIT</b>			R203, 243	1-242-725	150 kΩ
L195	1-231-069	coil, 1.8 mH	C191	1-141-034	30~200 p1000 V trimmer				R204, 244	1-242-719	82 kΩ
L196	1-231-069	coil, 1.8 mH	C192	1-141-034	30~200 p1000 V trimmer				R205, 245	1-242-705	22 kΩ
T181	1-433-148	transformer, bias osc	C193	1-107-028	620 p 500 V silvered mica	<b>SEMICONDUCTORS</b>			R206, 246	1-242-739	560 kΩ
<b>CAPACITORS</b>			C194	1-107-028	620 p 500 V silvered mica	Q201, 206		transistor 2SC631A	R207, 247	1-242-657	220 Ω
All capacitors in microfarads, unless otherwise indicated. (p = μF, elect = electrolytic)			C195	1-107-181	330 p 500 V silvered mica	Q202, 207		transistor 2SC631A	R208, 248	1-242-697	10 kΩ
			C196	1-107-181	330 p 500 V silvered mica	Q203, 208		transistor 2SC634A	R209, 249	1-242-691	5.6 kΩ
			C197	1-107-028	620 p 500 V silvered mica	Q204, 209		transistor 2SC634A	R210, 250	1-242-681	2.2 kΩ
			<b>RESISTORS</b>			Q205, 210		transistor 2SC634A	R211, 251	1-242-731	270 kΩ
						D201, 241		diode 1T22	R212, 252	1-242-673	1 kΩ
			All resistors are 1/4W and carbon type, unless otherwise indicated.						R213, 253	1-221-978	4.7 kΩ (B) semi-fixed PB 19 cm/s EQ
			R101, 141	1-242-729	220 kΩ	<b>TRANSFORMERS</b>			R214, 254	1-221-978	4.7 kΩ (B) semi-fixed PB 9.5 cm/s EQ
			R102, 142	1-242-713	47 kΩ						
			R103, 143	1-242-691	5.6 kΩ	<b>CAPACITORS</b>			R215, 255	1-242-685	3.3 kΩ
			R104, 144	1-242-677	1.5 kΩ	All capacitors in microfarads, unless otherwise indicated. (p = μF, elect = electrolytic)			R216, 256	1-242-697	10 kΩ
			R105, 145		- discarded -				R217, 257	1-242-725	150 kΩ
			R106, 146	1-242-651	120 Ω				R218, 258	1-242-705	22 kΩ
			R107, 147	1-242-701	15 kΩ				R219, 259	1-242-705	22 kΩ
			R108, 148	1-242-697	10 kΩ				R220, 260	1-242-681	2.2 kΩ
			R109, 149		- discarded -				R221, 261	1-242-717	68 kΩ
			R110, 150	1-242-729	220 kΩ	C201, 241	1-121-395	4.7 25 V elect	R222, 262	1-242-667	560 Ω
			R111, 151	1-242-721	100 kΩ	C202, 242	1-121-410	47 25 V elect	R223, 263	1-242-681	2.2 kΩ
						C203, 243	1-105-661-12	0.001 50 V mylar	R224, 264	1-242-669	680 Ω

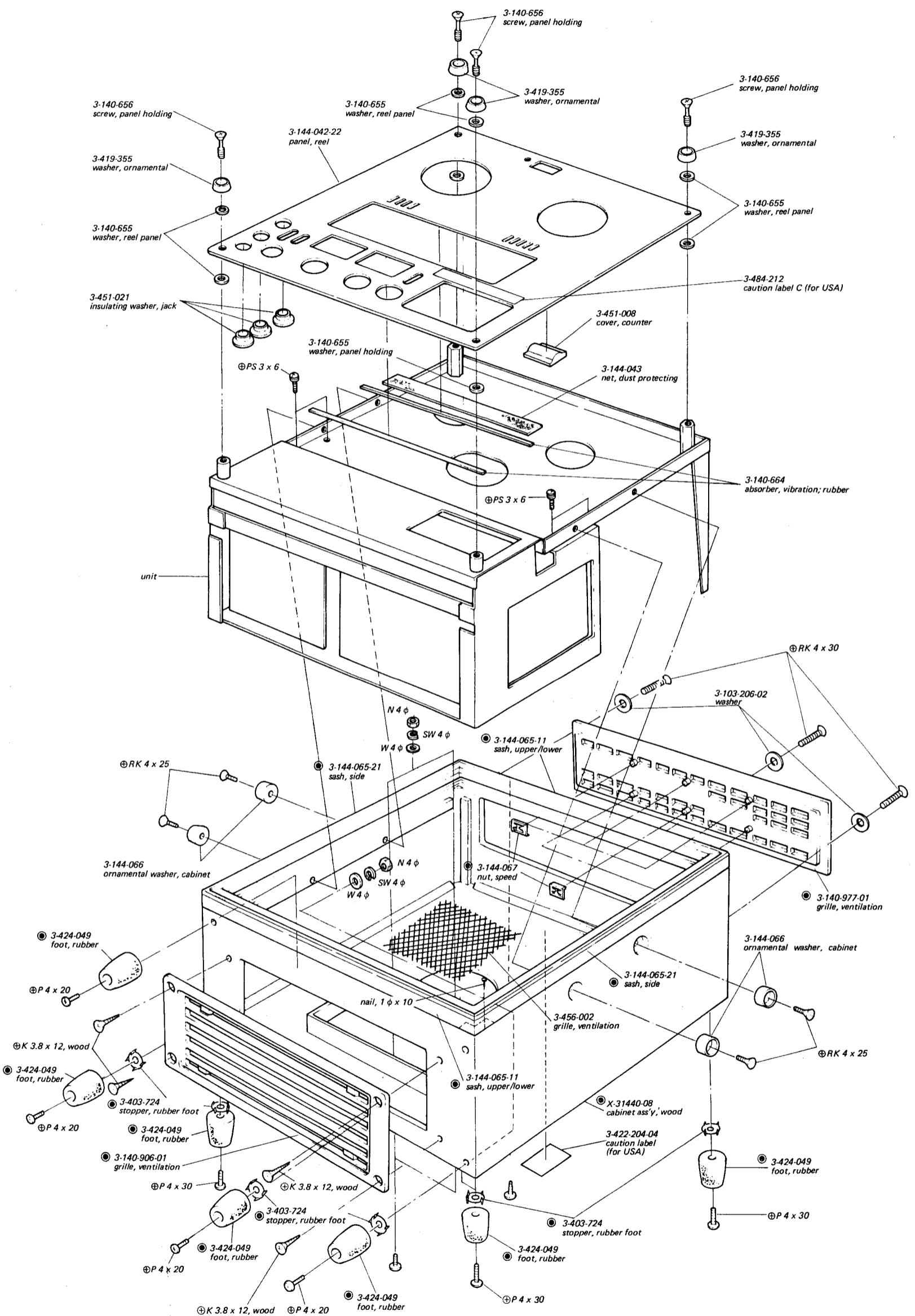
**TC-640**

## **TC-640**

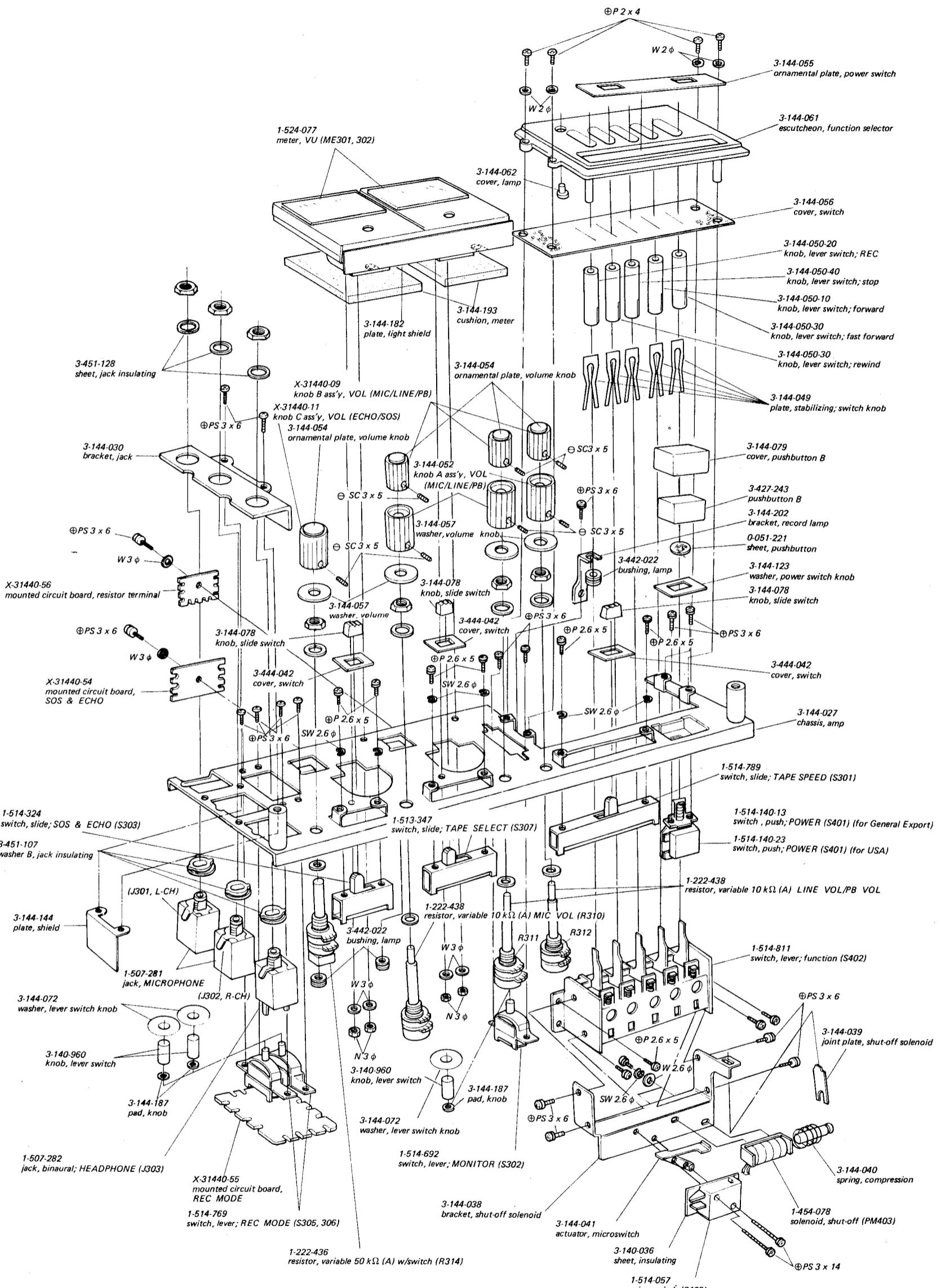
## **SECTION 9**

### **EXPLODED VIEWS**

### 9-1. CABINET – Top View –

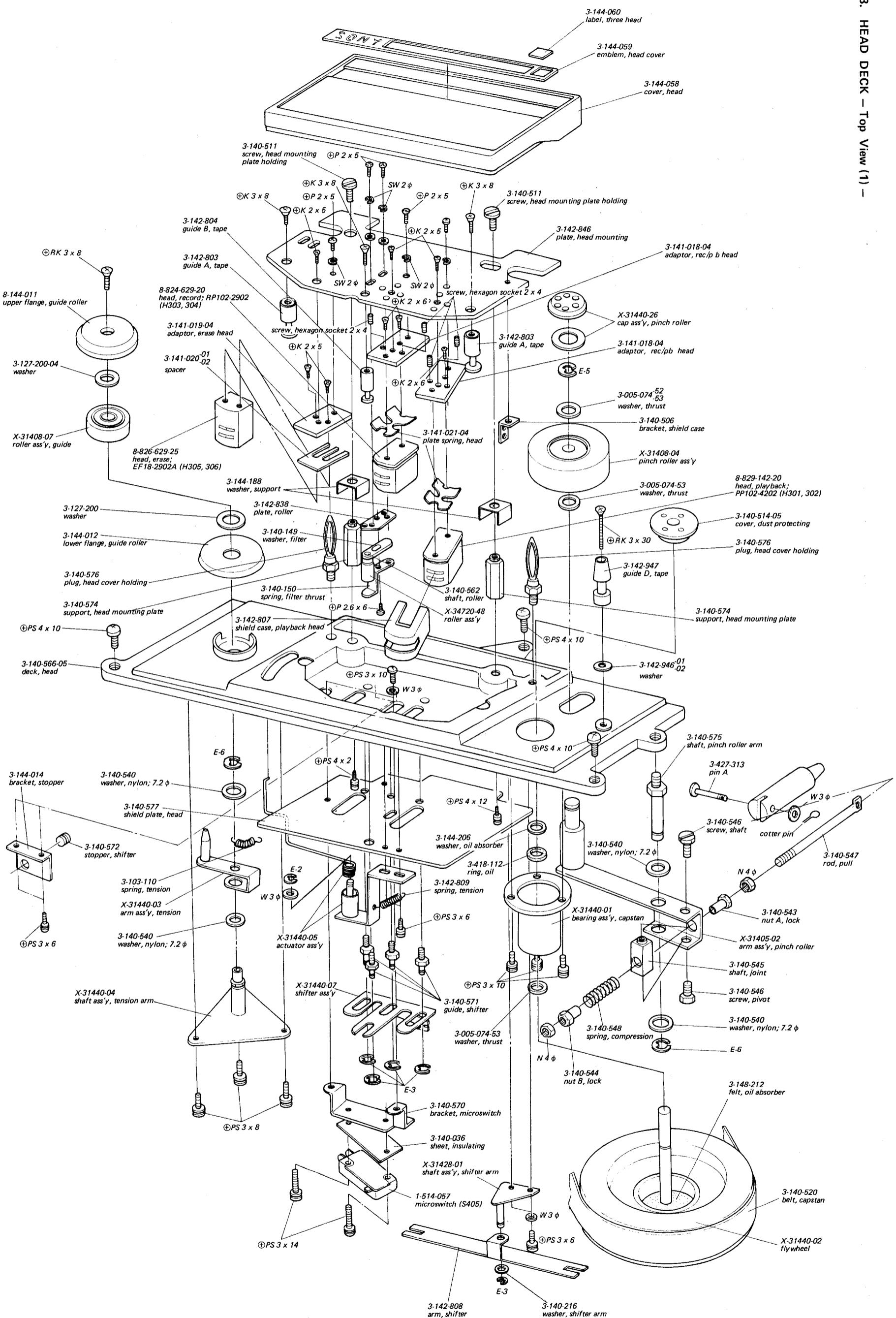


Parts marked with  are included in cabinet ass'y, wood (X-31440-08)



TC-640 TC-640

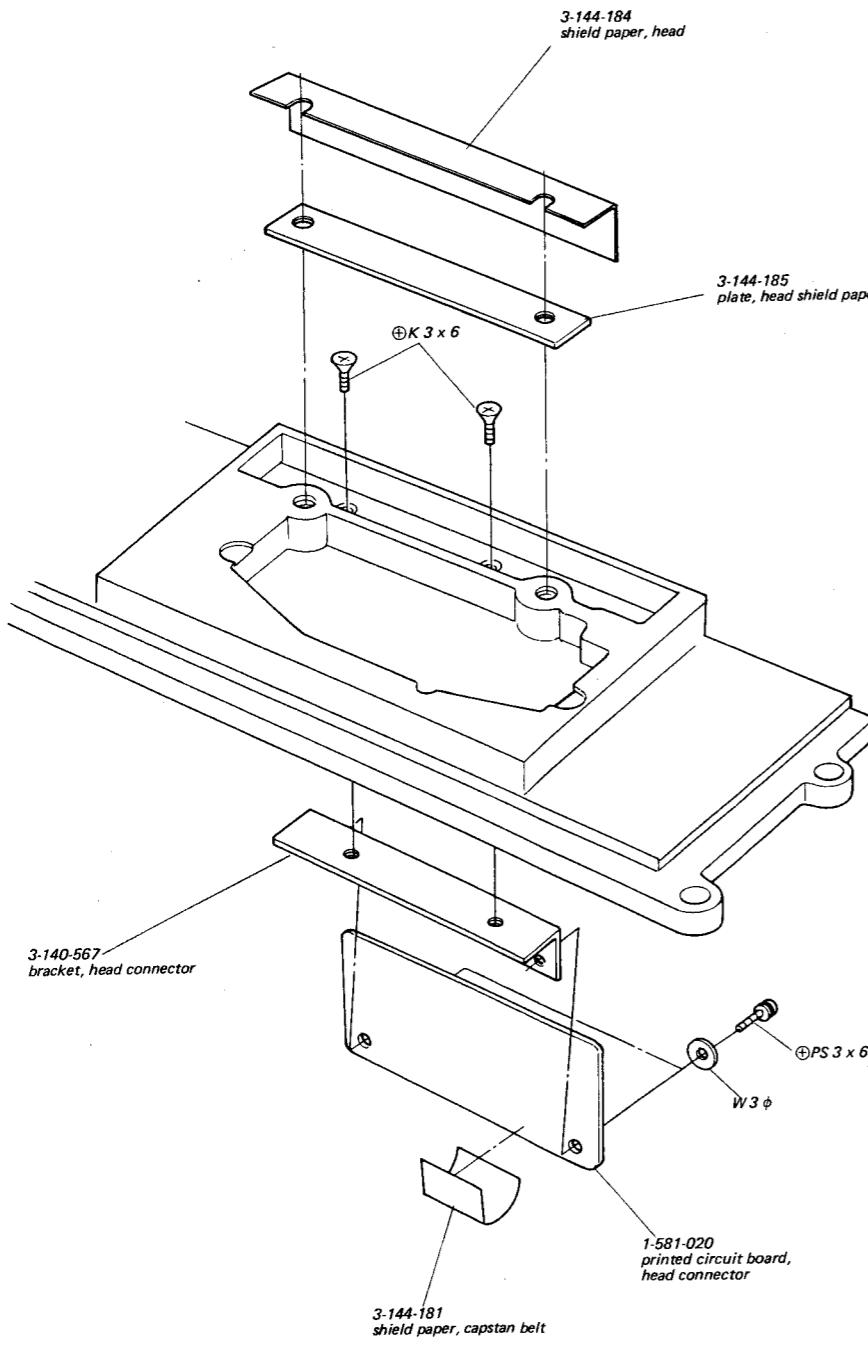
### 9-3. HEAD DECK – Top View (1) –



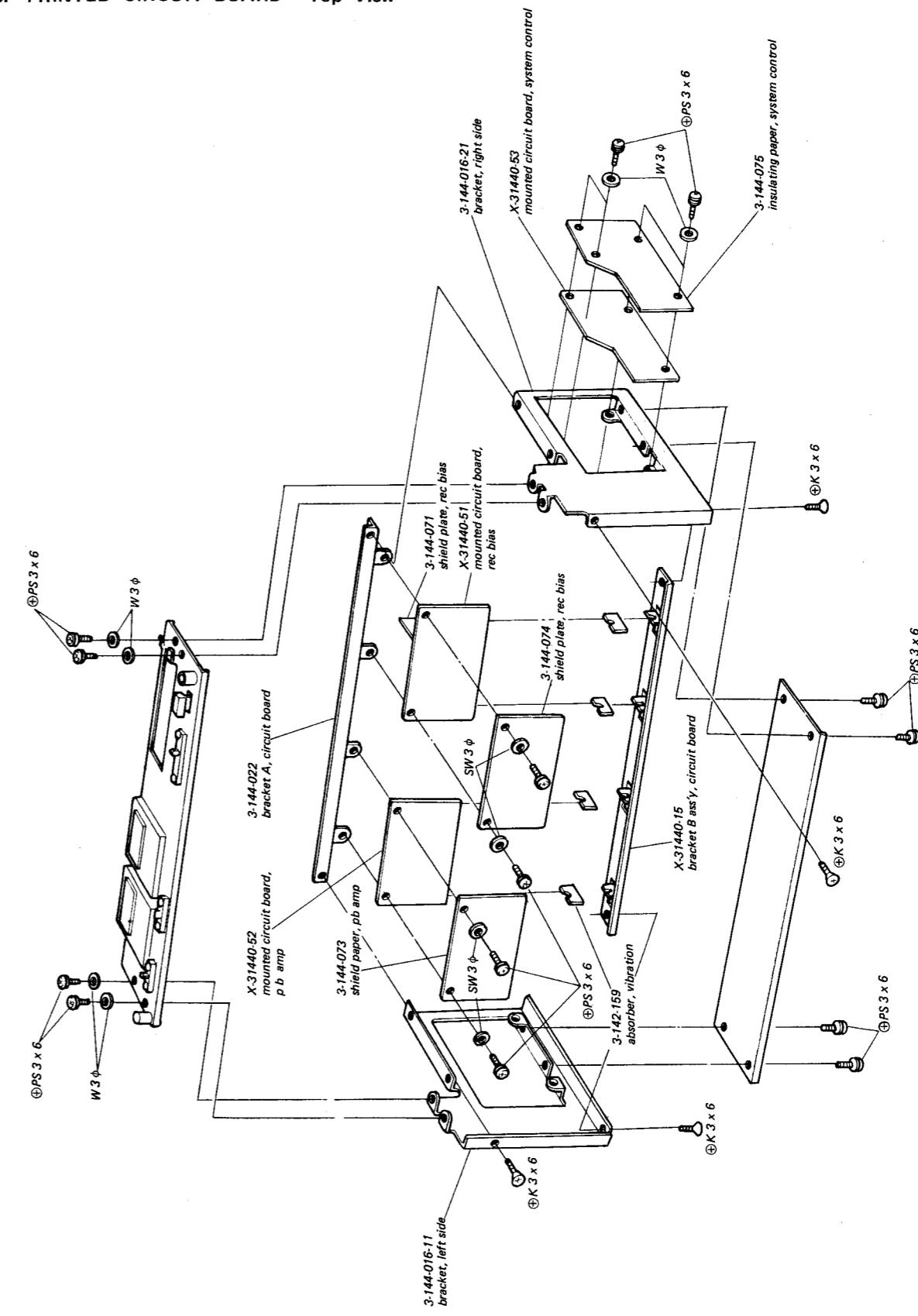
15

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## 9-4. HEAD DECK – Top View (2) –



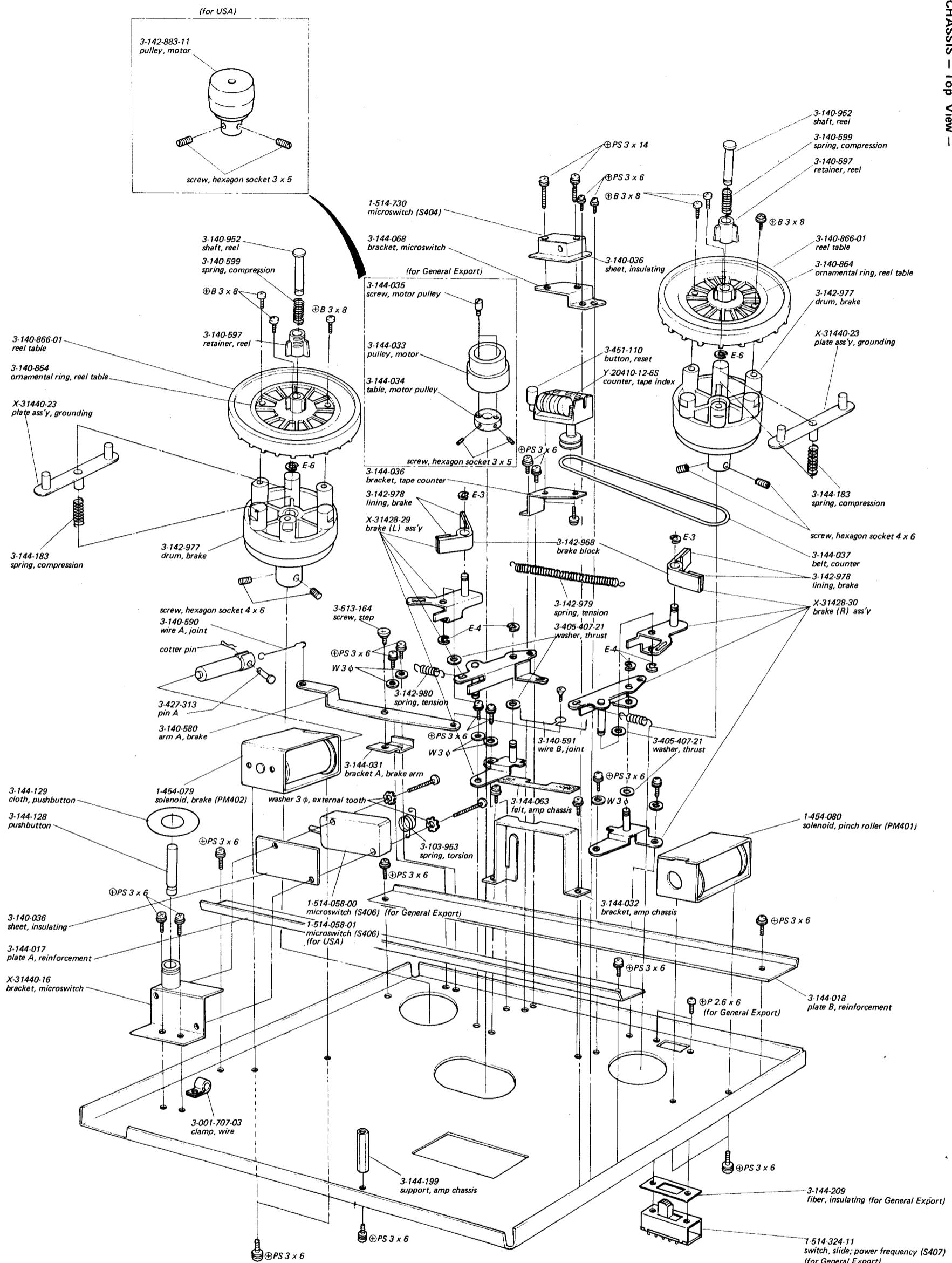
## 9-5. PRINTED CIRCUIT BOARD – Top View –



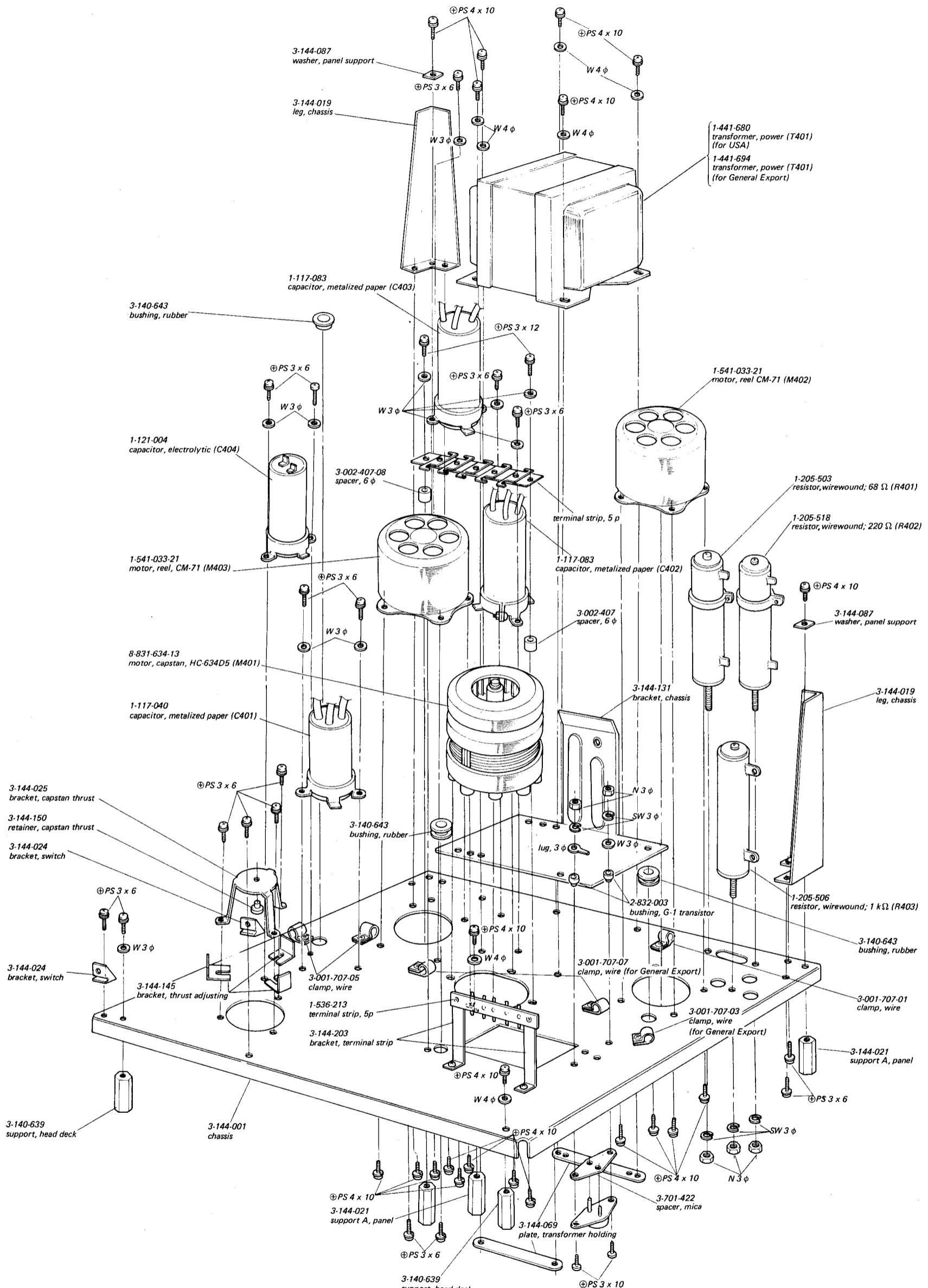
# TC-640 TC-640

9-6. CHASSIS - Top View -

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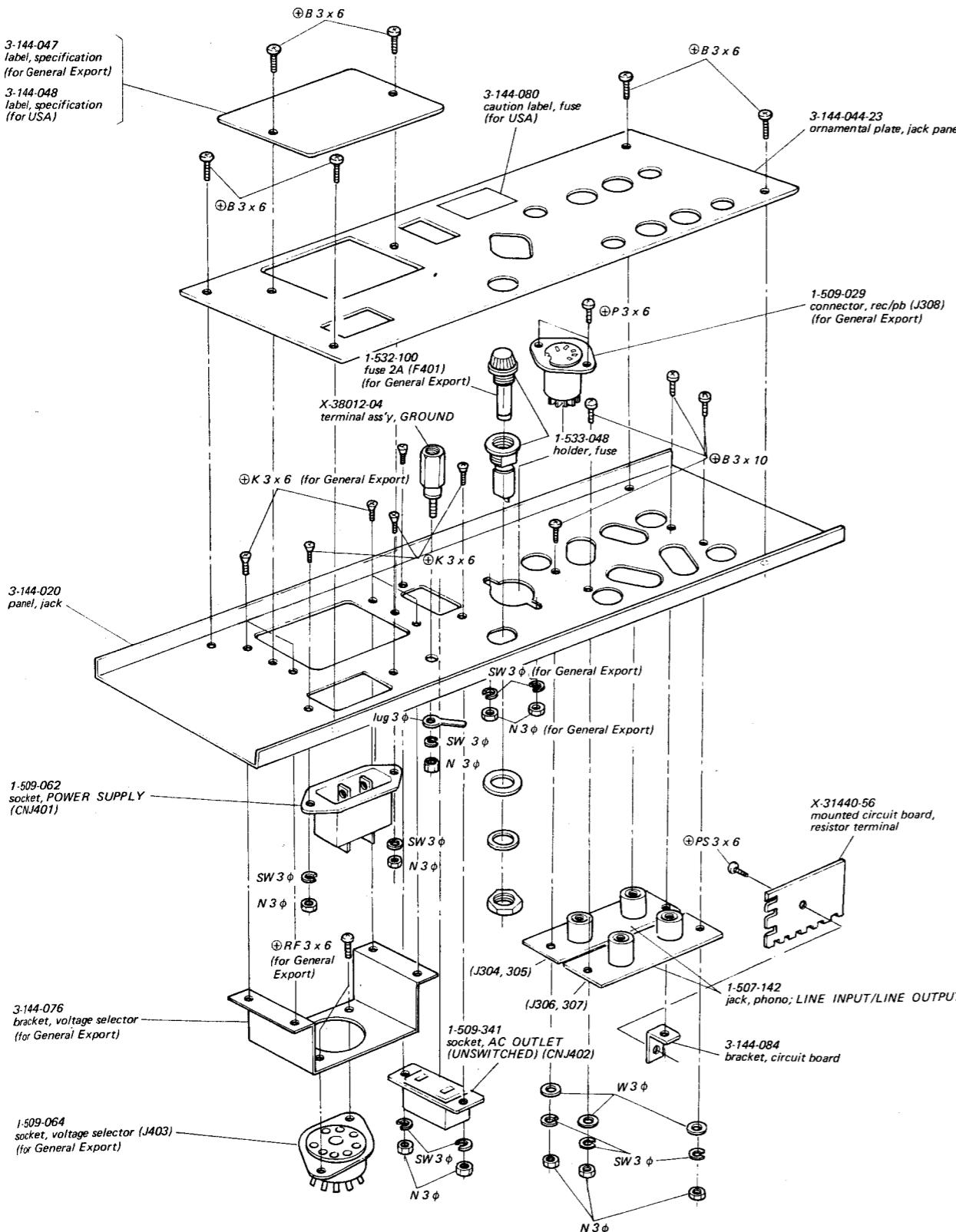


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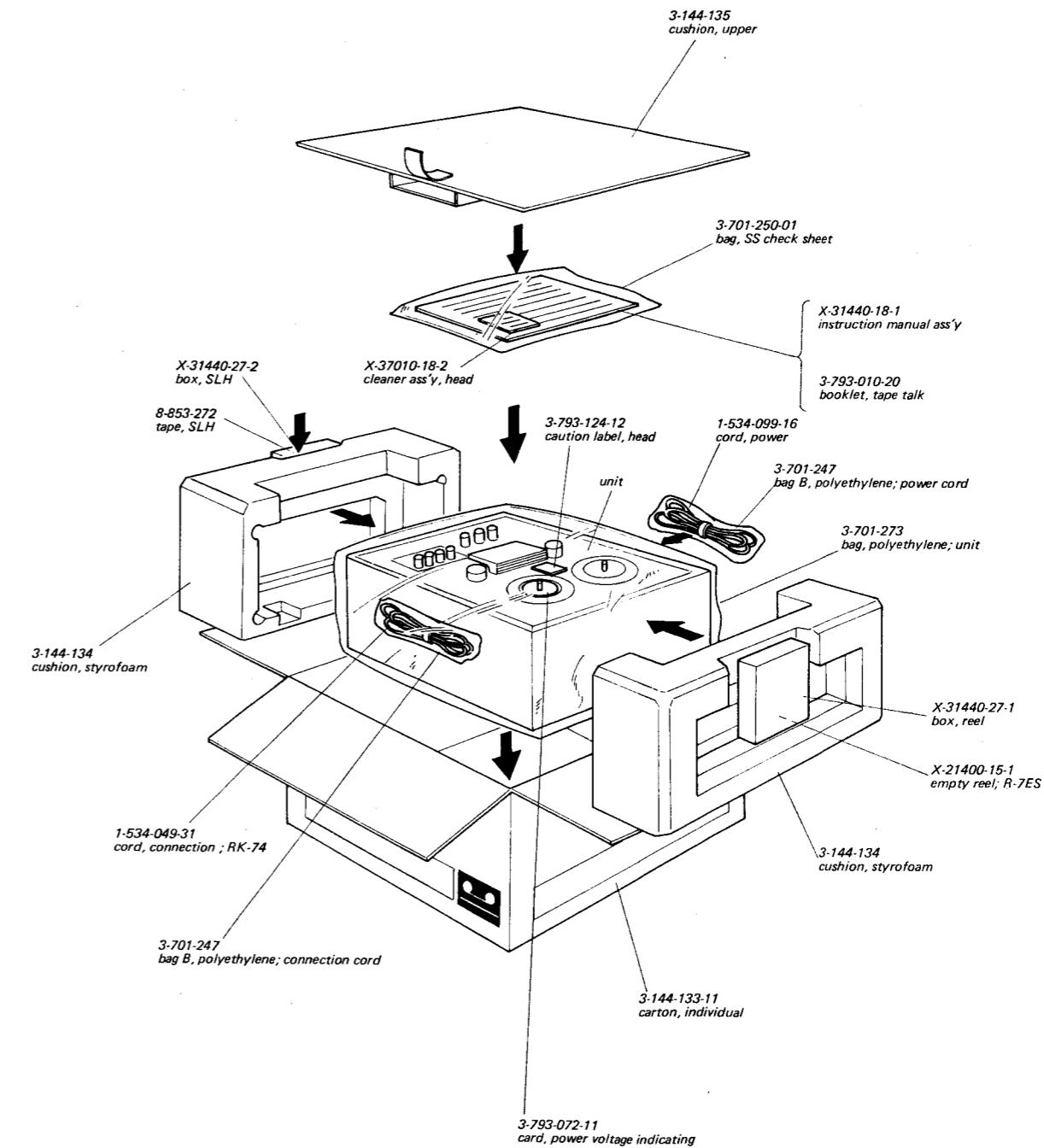


## **TC-640 TC-640**

## **9-8. JACK PANEL**

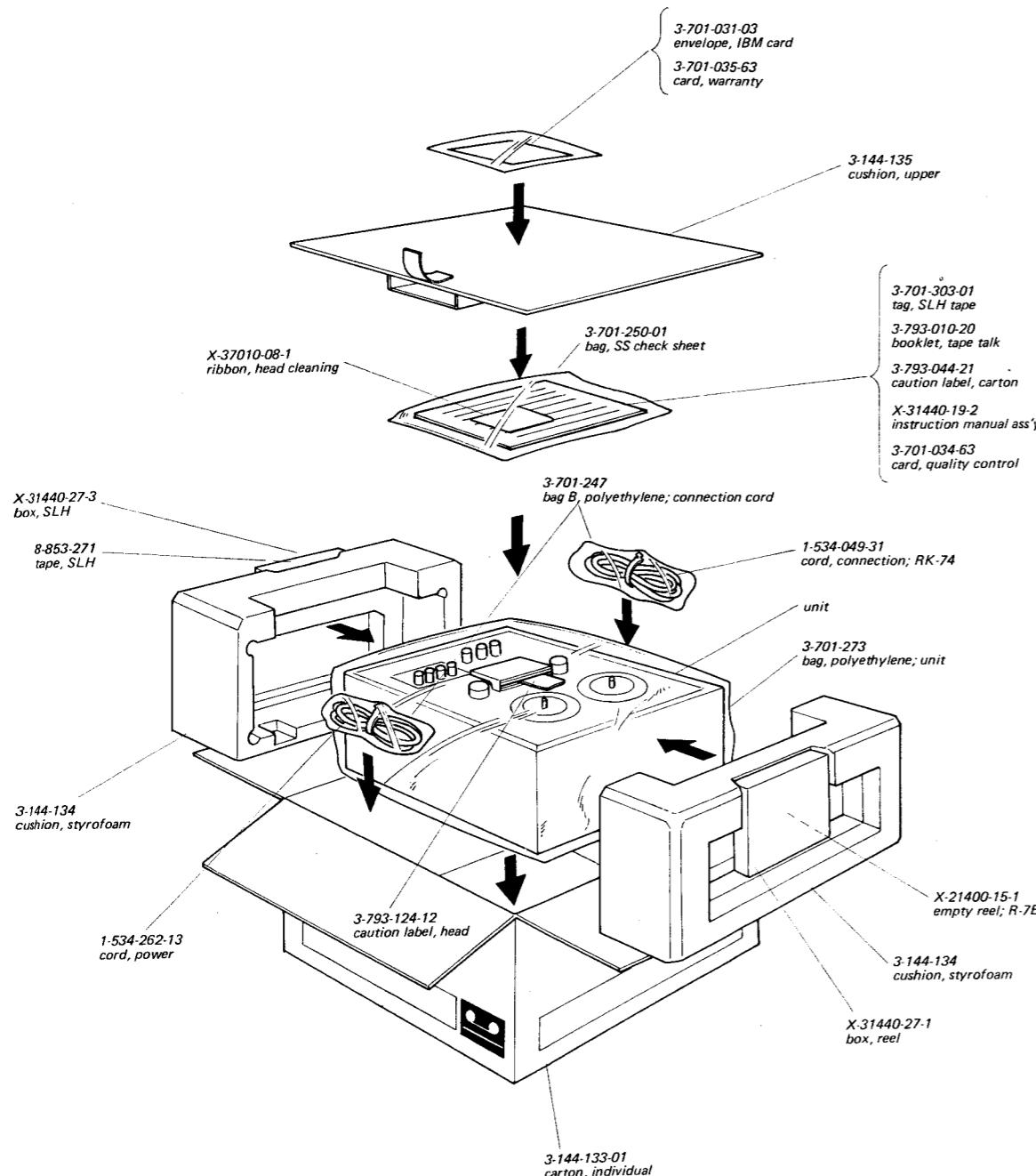


#### **9-9. PACKING (for General Export)**



## SECTION 10

### HARDWARES

**PACKING (for USA)****Part No.****Description****Part No.****Description****SCREWS**

7-621-770-88	⊕B 2.6 x 6
7-621-842-39	⊕RK 2.7 x 10, wood
7-682-124-02	⊕P 2 x 4
7-682-126-02	⊕P 2 x 6
7-682-130-02	⊕P 2 x 14
7-682-147-04	⊕P 3 x 6
7-682-152-02	⊕P 3 x 16
7-682-166-02	⊕P 4 x 30
7-682-168-02	⊕P 4 x 20
7-682-225-02	⊕K 2 x 5
7-682-226-02	⊕K 2 x 6
7-682-247-02	⊕K 3 x 6
7-682-248-02	⊕K 3 x 8
7-682-259-33	⊕P 2.6 x 5
7-682-348-04	⊕RK 3 x 8
7-682-355-04	⊕RK 3 x 30
7-682-367-04	⊕RK 4 x 25
7-682-526-02	⊕B 2 x 6
7-682-547-05	⊕B 3 x 6
7-682-548-05	⊕B 3 x 8
7-682-565-05	⊕B 4 x 16
7-682-645-02	⊕PS 3 x 4
7-682-647-02	⊕PS 3 x 6
7-682-649-02	⊕PS 3 x 10
7-682-650-02	⊕PS 3 x 12
7-682-651-02	⊕PS 3 x 14
7-682-662-02	⊕PS 4 x 10
7-682-663-02	⊕PS 4 x 12
7-683-127-31	2 x 4, set; hexagon socket
7-683-138-31	3 x 4, set; hexagon socket
7-683-247-31	4 x 6, set; hexagon socket

**WASHERS**

7-623-105-24	2 φ
7-623-107-24	2.6 φ
7-623-108-04	3 φ (small)
7-623-108-24	3 φ
7-623-110-24	4 φ
7-623-205-21	2 φ , spring
7-623-207-21	2.6 φ
7-623-208-21	3 φ
7-623-210-21	4 φ

**RETAINING RINGS**

7-624-106-01	E-3
7-624-108-01	E-4
7-624-109-01	E-5
7-624-110-01	E-6

**NUTS**

7-684-013-02	3 φ
7-684-014-02	4 φ
7-626-202-31	Cotter Pin 1 φ × 10

**Hardware Nomenclature**

<b>P</b> — Pan Head Screw .....	◇	—	<b>E</b> — Retaining Ring (E Washer) .....	◎
<b>K</b> — Flat Countersunk Head Screw .....	◇	—	<b>W</b> — Washer .....	—
<b>B</b> — Binding Head Screw .....	◇	—	<b>SW</b> — Spring Washer .....	—
<b>RK</b> — Oval Countersunk Head Screw .....	◇	—	<b>LW</b> — Lock Washer .....	—
<b>T</b> — Truss Head Screw .....	◇	—	<b>N</b> — Nut .....	—
<b>R</b> — Round Head Screw .....	◇	—		
<b>F</b> — Flat Fillister Head Screw .....	—	—		
<b>SC</b> — Set Screw .....	⊖	—		

**Example**

Type of Slot	⊕	P 3 x 10
Length in mm (L)	L	L
Diameter in mm (D)	D	D
Type of Head		D

When ordering replacement parts, you should use PART NUMBER listed on the Parts Lists or shown in the EXPLODED VIEW. The reference number should not be used for ordering purposes.